Tranquility® Vertical Stack (TSM) Series Submittal Data

Models TSM09 - 36
60Hz - HFC-410A

English Language/I-P Units

Revised: 16 December, 2014

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ClimateMaster®
Water-Source Heat Pump Systems

SUBMITTAL DATA - I-P UNITS

Unit Designation: _____

Job Name: _____

Architect: _____

Engineer: _____

Contractor: _____

PERFORMANCE DATA

Cooling Capacity: _____ Btuh

EER: _____

Heating Capacity: _____ Btuh

COP: _____

Ambient Air Temp: _____ °F

Entering Water Temp (Clg): _____ °F

Entering Air Temp (Clg): _____ °F

Entering Water Temp (Htg): _____ °F

Entering Air Temp (Htg): _____ °F

Airflow: _____ CFM

Fan Speed or Motor/RPM/Turns: _____

Operating Weight: _____ (lb)

ELECTRICAL DATA

Power Supply: _____ Volts

_____ Phase _____ Hz

Minimum Circuit Ampacity: _____

Maximum Overcurrent Protection: _____

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Models TSM09 - 36
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ClimateMaster®
Water-Source Heat Pump Systems

SUBMITTAL DATA - S-I UNITS

Unit Designation: _____

Job Name: _____

Architect: _____

Engineer: _____

Contractor: _____

PERFORMANCE DATA

Cooling Capacity: _____ kW

EER: _____

Heating Capacity: _____ kW

COP: _____

Ambient Air Temp: _____ °C

Entering Water Temp (Clg): _____ °C

Entering Air Temp (Clg): _____ °C

Entering Water Temp (Htg): _____ °C

Entering Air Temp (Htg): _____ °C

Airflow: _____ l/s

Fan Speed or Motor/RPM/Turns: _____

Operating Weight: _____ (kg)

ELECTRICAL DATA

Power Supply: _____ Volts

_____ Phase _____ Hz

Minimum Circuit Ampacity: _____

Maximum Overcurrent Protection: _____

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Unit Features

TRANQUILITY® VERTICAL STACK (TSM) SERIES WITH EARTHPURE® REFRIGERANT

The Tranquility® Vertical Stack (TSM) Series offers an innovative, labor-saving solution for spaces where individual, quiet control of the heating and cooling system is important. TSM units' consist of 2 major components - cabinet behind finished wall and slide in refrigeration chassis. Vertical risers running behind cabinet are especially ideal for multi-story buildings. Risers can be ordered assembled to cabinet or shipped separate so riser stack can be completely assembled, pressure tested, filled, and water circulated. This allows floor by floor completion and occupancy before construction is completed. TSM units can operate as stand-alone "ductless" systems, or can be ducted to an adjacent room, making them convenient for low-rise buildings as well. The TSM Series exceeds ASHRAE 90.1 efficiencies, yet maintains small cabinet dimensions. Using EarthPure® (HFC-410A) refrigerant, the TSM Series not only protects the environment, it does so while delivering unprecedented comfort, efficiency, and reliability.

Available in sizes 3/4 ton (2.6 kW) through 3 tons (10.6 kW) with numerous cabinet, water piping and control choices, the TSM Series offers a wide range of units for most any installation. The TSM has an extended range refrigerant circuit, capable of ground loop (geothermal) applications as well as water loop (boiler-tower) applications. Standard features are many. Microprocessor controls, TXV metering device, galvanized steel cabinet, torsion-flex blower motor mounting, and (optional) ECM motor for all models are just some of the features of the innovative TSM Series.

ClimateMaster's exclusive double isolation compressor mounting system makes the TSM Series the quietest vertical stack units on the market. Compressors are mounted on specially engineered sound-tested EPDM grommets to a heavy gauge base pan, which is then isolated from the cabinet base with grommets under the condensate pan for maximized vibration/sound attenuation. Factory-installed internal options such as DDC controls, ECM motors, single speed pump, variable speed pump, auto flow water regulator, 2-way water solenoid valve, and modulating water valve allow customized design solutions.

iGate™ technology is the next generation in intelligent control by using two-way communication to provide a gateway into the system. The iGate™ control system allows end-users and contractors to monitor the performance of the unit, custom tailor its operation, and diagnose any issues, right from the ATC thermostat, or diagnostic tool.

The iGate™ communications hub is the DXM2 intelligent controller, which analyzes the status of sensors and smart components (which are also two-way communicating) to determine how best to operate the system for optimal comfort, efficiency and long-term reliability. All of this information is passed to the iGate™ thermostat (or diagnostic tool), where it can be displayed in plain English. And since communication is both ways, the iGate™ thermostat can also be used to configure and tailor the system without even touching the unit.

vFlow™ variable water flow technology represents a major advance in water-source system performance made possible through the iGate™ system. vFlow™ not only builds the major water circulation components into the unit for a clean installation, it also intelligently varies the water flow to minimize pump energy consumption and improve system reliability. vFlow™ also allows cooling and heating operation across the entire 20–120°F entering water conditions, providing ultimate flexibility in designing water-source heating and cooling systems with ClimateMaster vFlow™ units.

The heart of vFlow™ is either a variable-speed pump or modulating water valve directly linked into the iGate™ system. Water flow is automatically varied based on T, in turn changes in unit capacity level (stage) and source water temperature to maintain optimum system performance. vFlow™ allows the use of direct return piping, while eliminating external two-ways valves and automatic flow regulators. vFlow™ systems are inherently self-balancing. vFlow™ with automatically modulating valves deliver superior value by being priced competitively with inefficient two-way valve with auto flow regulator options.

⚠ ATTENTION! ⚠

TSM has different riser configurations than TRM.
TSM chassis will not fit into the TRM Cabinet.
TSM return air side is defined as the front of unit.
TSM - G panel only.
TSM - All Cabinets - Field must remove supply air knockouts, install duct angles, and remove riser knockouts.

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Unit Features

vFlow™ systems provide reduced water pumping power compared to traditional fixed-speed pumping or fixed water flow systems and protects the unit against extreme operating conditions, extending the life of the compressor and air coil. Since vFlow™ is built inside the unit, it also saves on installation time and makes for a very clean and compact installation. The Tranquility® TSM Series water-source heat pumps are designed to meet the challenges of today's HVAC demands with one of the most innovative products available on the market.

The TSM Series Vertical Stack Water-Source Heat Pumps are designed to meet the challenges of today's HVAC demands with a low cost/high value solution.

UNIT FEATURES

- Sizes 09 (3/4 ton, 2.6 kW) through 36 (3 ton, 10.6 kW)
- Environmentally-friendly EarthPure® (HFC-410A) zero ozone depletion refrigerant
- High efficiency rotary and scroll compressors
- Exceeds ASHRAE 90.1 efficiencies
- Removable chassis allows staged installation and ease of maintenance
- Galvanized steel cabinet
- Chassis rests on rubber grommeted isolated condensate pan for vibration reduction.
- Double isolation of compressor for quiet operation
- UltraQuiet option
- Air coil hairpins are tin-plated; Option non-plated
- TXV metering device
- Cabinet construction for unit or remote-mounted controls
- Two fan speed capability with CXM or DXM2
- Microprocessor controls standard (optional DXM2 and/or DDC controls)
- **Optional Advanced Controls** - iGate™ communicating control provides advanced unit functionality and comprehensive configuration, monitoring and diagnostic capabilities through digital communication links with the variable-speed fan motor, variable-speed source pump (or modulating valve) and communicating thermostat or Configuration/Diagnostic tool.
  - 7 temperature sensor inputs for system protection and control
  - Anti-short cycle and over/under voltage protection
  - High pressure, loss of charge, and condensate overflow protection
  - LED fault and status indication at controller
  - Service tool port for optional setup and diagnostics at unit
- Eight Safeties Standard.
- Filter Rail for 1" or 2" Filter
- LonWorks, BACnet, Modbus and Johnson N2 compatibility options for DDC controls
- Unit Performance Sentinel performance monitoring system
- Integrated drain pan with condensate overflow sensor
- Attractive return air panel with hinged access door ("G" panel) - option key locked.
- Multiple supply air discharge options
- Full port shut-off valves with memory stop, for supply and return, located opposite return air panel inside cabinet
- Stainless steel braided hose kits for connection from piping risers to chassis
- Wide variety of cabinet options including disconnect switch, breaker, thermostat whip with molex connector, isolation pad, stainless steel drain pan, riser chase, and ECM variable speed communicating and electric heat motor.
- Wide variety of chassis options including stainless steel drain pan, insulated tubing for extended range operation, vFlow™ (modulating valve normally closed or variable speed pump), autoflow regulator, motorized water valve (normally closed), secondary circulating pump, and cupro-nickel coaxial heat exchanger
- Selection of thermostats including manual changeover, automatic changeover, or programmable are available.
- Accessory Filters, 1" Merv 8 and 11; 2" Merv 8 and 13

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iGate™ Communicating Controls

iGate™ Information gateway to monitor, control and diagnose your system

Tranquility® Vertical Stack Series is equipped with industry-first, iGate™ – Information Gateway – 2-way communicating system that allows users to interact with their water-source system in plain English AND delivers improved reliability and efficiency by precisely controlling smart variable speed components.

Monitor/Configure – Installers can configure from the iGate™ communicating thermostat or configuration/ diagnostic tool, including: Air flow, loop delta T, water-flow option configuration, unit configuration, accessory configuration, and demand reduction (optional, to limit unit operation during peak times). Users can look up the current system status: temperature sensor readings and operational status of the blower and pump.

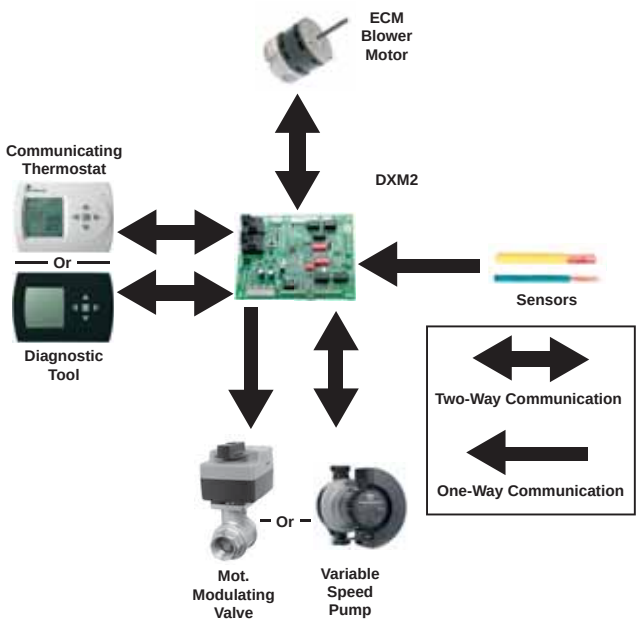
Precise Control – The new DXM2 board enables intelligent, 2-way communication between the DXM2 board and smart components like the communicating thermostat, fan motor, and water pump. The DXM2 control can also directly control the modulating valve and accepts various feedback/input (see figure). The Intelligent DXM2 board uses information received from the smart components and sensors to precisely control operation of variable speed fan, variable speed water pump (or modulating valve) to deliver higher efficiency, reliability and increased comfort.

Diagnostics – iGate™ takes diagnosing geothermal units to a next level of simplicity, by providing a dashboard of system and fault information, in plain English, on the iGate thermostat/ service tool.

iGate™ Service Warning warns the occupant of a fault and displays fault description, possible causes and current system status (temperature readings, fan RPM and water flow status) which may be reported to service personnel.

In iGate™ Service Mode, the service personnel can access fault description, possible causes and most importantly, the conditions (temp, flow, i/o conditions, configuration) at the time of the fault. Manual Operation mode allows the service personnel to manually command operation for any of the thermostat outputs, blower speed, as well as pump speed or valve position from the thermostat, to help troubleshoot specific components.

With iGate™ communicating system, users and contractors have a gateway to system information never before available.



AIRFLOW SELECTION	CFM
HEAT STAGE 1	600
HEAT STAGE 2	750
AUXILIARY HEAT	850
EMERGENCY HEAT	850
COOL STAGE 1	525
COOL STAGE 2	700
COOL DEHUMID 1	425
COOL DEHUMID 2	550
CONTINUOUS FAN	350
HEAT OFF DELAY	60
COOL OFF DELAY	30

◀ PREVIOUS NEXT ▶

POSSIBLE FAULT CAUSES
LOW WATER COIL TEMP

LOW WATER TEMP - HTG

LOW WATER FLOW - HTG

LOW REFRIG CHARGE - HTG

INCORRECT LT1 SETTING

BAD LT1 THERMISTOR

◀ PREVIOUS

FAULT TEMPERATURE CONDITIONS
LT1 LOW WATER TEMP
HEAT 1 11:11 AM 11/14

LT1 TEMP	28.1
LT2 TEMP	97.3
HOT WATER EWT	121.5
COMP DISCHARGE	157.7
LEAVING AIR	92.7
LEAVING WATER	34.9
ENTERING WATER	42.1
CONTROL VOLTAGE	26.4

◀ PREVIOUS

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vFlow™ Internal Variable Water Flow Control

vFlow™ Internal Variable Water Flow
Industry-first, Built-in vFlow™ provide an ultra-high-efficient, variable speed, internal water flow system. It saves installers time and labor by avoiding installing bulky external pumps, valves, or flow regulators. Multi-unit installations are also much simpler with vFlow™ systems, as the units automatically adjust water flow across the system.

vFlow™ is enabled by iGate™, which facilitates intelligent communication between the thermostat, DXM2 control, sensors and internal water pump/valve to make true variable water flow a reality.

vFlow™ is available in two variations:
1. Low System Pressure Drop Modulating Valve – High CV motorized valve for central pumping.
2. Standard Head Variable Pump – multi unit/central pumping.

vFlow™ delivers three main benefits:
1. Easier and quicker unit installation as the flow control is built in to the unit.
2. Superior reliability by varying the water flow to deliver more stable operation across the entering water range (20°–120°F, heating and cooling).
3. Higher cost savings by varying the flow (and pump watt consumption) to match the unit's mode of operation.

Variable flow
vFlow™ technology enables variable water flow through the unit, with the DXM2 control adjusting the pump speed to maintain an installer-set loop delta T. By controlling the water flow, the system is able to operate at its optimal capacity and efficiency. vFlow™ provides a lower flow rate for part load where units typically operate 80% of the time and a higher, more normal flow rate for full load operation.

Variable speed pump or motorized modulating valve delivers variable water-flow, controlled by DXM2 control, based on loop water ΔT.

Energy Savings with water circulation control
Units with vFlow™ deliver higher operating cost savings by varying the water flow to match the unit's operation (ex: lower water flow when unit is in part load operation). Lowering the flow results in lower energy consumption by the water pump (=higher cost savings) in vFlow™ units.

In applications using vFlow™ with internal variable-speed (ECM) pump, the ECM pump uses fewer watts than a fixed speed (PSC) pump, even at full load. The ECM pump excels in energy savings in part load, saving 70 –80% watts compared to fixed speed pumps (see chart). The ECM pump can operate with independent flow rates for heating and cooling, further saving more energy.

In applications using vFlow™ with modulating valve, when the motorized modulating valve slows down the water flow during part load operation, the external pump consumes fewer watts, thus saving more energy.

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Selection Procedure

Reference Calculations

Heating

$$LWT = EWT - \frac{HE}{GPM \times Constant}$$

$$LAT = EAT + \frac{HC}{CFM \times 1.08}$$

Cooling

$$LWT = EWT + \frac{HE}{GPM \times Constant}$$

$$LAT\ (DB) = EAT\ (DB) - \frac{SC}{CFM \times 1.08}$$

$$LC = TC - SC$$

$$S/T = \frac{SC}{TC}$$

Constant = 500 for water, 485 for antifreeze.

Legend and Glossary of Abbreviations

BTUH = BTU(British Thermal Unit) per hour
CFM = airflow, cubic feet/minute
COP = coefficient of performance = BTUH output/BTUH input
DB = dry bulb temperature (°F)
EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)
EER = energy efficiency ratio = BTUH output/Watt input
MPT = male pipe thread
ESP = external static pressure (inches w.g.)
EWT = entering water temperature
GPM = water flow in U.S. gallons/minute
HE = total heat of extraction, BTUH
HC = air heating capacity, BTUH
HR = total heat of rejection, BTUH
HWC = hot water generator (desuperheater) capacity, Mbtuh
FPT = female pipe thread
KW = total power unit input, kilowatts
LAT = leaving air temperature, °F
LC = latent cooling capacity, BTUH
LWT = leaving water temperature, °F
MBTUH = 1000 BTU per hour
S/T = sensible to total cooling ratio
SC = sensible cooling capacity, BTUH
TC = total cooling capacity, BTUH
WB = wet bulb temperature (°F)
WPD = waterside pressure drop (psi & ft. of hd.)

Conversion Table - to convert inch-pound (English) to S-I (Metric)

Air Flow	Water Flow	Ext Static Pressure	Water Pressure Drop
Airflow (L/s) = CFM x 0.472	Water Flow (L/s) = gpm x 0.0631	ESP (Pa) = ESP (in of wg) x 249	PD (kPa) = PD (ft of hd) x 2.99

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Selection Procedure

Step 1 Determine the actual heating and cooling loads at the desired dry bulb and wet bulb conditions.

Step 2 Obtain the following design parameters: Entering water temperature, water flow rate in GPM, air flow in CFM, water flow pressure drop and design wet and dry bulb temperatures. Air flow CFM should be between 300 and 500 CFM per ton. Unit water pressure drop should be kept as close as possible to each other to make water balancing easier. Go to the appropriate tables and find the proper indicated water flow and water temperature.

Step 3 Select a unit based on total and sensible cooling conditions. Select a unit which is closest to, but no larger than, the actual cooling load.

Step 4 Enter tables at the design water flow and water temperature. Read the total and sensible cooling capacities (Note: interpolation is permissible, extrapolation is not).

Step 5 Read the heating capacity. If it exceeds the design criteria it is acceptable. It is quite normal for Water-Source Heat Pumps to be selected on cooling capacity only since the heating output is usually greater than the cooling capacity.

Step 6 Determine the correction factors associated with the variable factors of dry bulb, wet bulb, and air flow.

Corrected Total Cooling = tabulated total cooling x wet bulb correction x air flow correction.

Corrected Sensible Cooling = tabulated sensible cooling x wet/dry bulb correction, and air flow correction.

Step 7 Compare the corrected capacities to the load requirements. Normally if the capacities are within 10% of the loads, the equipment is acceptable. It is better to undersize than oversize, as undersizing improves humidity control, reduces sound levels and extends the life of the equipment.

Step 8 When completed, calculate water temperature rise and assess the selection. If the units selected are not within 10% of the load calculations, then review what effect changing the GPM, water temperature and/or air flow and air temperature would have on the corrected capacities. If the desired capacity cannot be achieved, select the next larger or smaller unit and repeat the procedure. Remember, when in doubt, undersize slightly for best performance.

Example Equipment Selection For Cooling

Step 1 Load Determination:

Assume we have determined that the appropriate cooling load at the desired dry bulb 80°F and wet bulb 65°F conditions is as follows

Total Cooling..... 17,000 BTUH
Sensible Cooling..... 12,000 BTUH
Entering Air Temp.....80°F Dry Bulb / 65°F Wet Bulb

Step 2 Design Conditions:

Similarly, we have also obtained the following design parameters:

Entering Water Temp ..... 90°F
Water Flow (Based upon 10°F rise in temp.)..... 5.1 GPM
Air Flow at ESP Unit..... 630 CFM (90% of rated)

Step 3, 4 & 5 HP Selection:

After making our preliminary selection (TSM18 with PSC motor), we enter the tables at design water flow and water temperature and read Total Cooling, Sens. Cooling and Heat of Rej. capacities:

Total Cooling .....18,350 BTUH
Sensible Cooling..... 13,210 BTUH
Heat of Rejection..... 22,470 BTUH

Step 6 & 7 Entering Air and Airflow Corrections:

Next, we determine our correction factors.

	Table	Ent Air	Air Flow	Corrected
Corrected Total Cooling	= 18,350	x 0.975	x 0.971	= 17,372
Corrected Sens Cooling	= 13,210	x 0.999	x 0.932	= 12,299
Corrected Heat of Reject	= 22,470	x 0.982	x 0.979	= 21,602

Step 8 Water Temperature Rise Calculation & Assessment:

Actual Temperature Rise..... 8.8°F

When we compare the Corrected Total Cooling and Corrected Sensible Cooling figures with our load requirements stated in Step 1, we discover that our selection is within +/- 10% of our sensible load requirement. Furthermore, we see that our Corrected Total Cooling figure is slightly undersized as recommended, when compared to the actual indicated load.

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TSM Series Nomenclature

Cabinet

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C	1	G	0	N	0	A	1	0	0	0	0	0	0	A

CABINET SIZE

1 = 09
2 = 12
3 = 15
4 = 18
5 = 24
6 = 30
7 = 36

VOLTAGE

OPTION	Volt/Hertz/Phaze
G	208-230/60/1
E	265/60/1

OPTIONS

OPTION	S.S. DRAIN PAN	PREMIUM SEAL	1˝ and 2˝ FILTER
A	–	X	1˝
B	X	–	1˝
C	X	X	1˝
0	–	–	1˝
1	–	X	2˝
2	X	–	2˝
3	X	X	2˝
4	–	–	2˝

HARNESS CONTROLS

OPTION	STD PSC	ECM	S=SURFACE R =REMOTE W = WALL SENSOR A = ADA	M = MPC L = LON
A	X	–	A	–
B	–	X	A	–
C	X	–	W	M
D	–	X	W	M
L	X	–	W	L
M	–	X	W	L
N	X	–	R	–
P	X	–	S	–
R	–	X	R	–
S	–	X	S	–

POWER TERMINATION

OPTION	DISCONNECT SWITCH	BREAKER	ISP / BREAKER	ELECTRIC HEATER
A	X	–	–	–
B	–	X	–	–
C	–	–	X	–
2	–	X	–	2.5 KW, 208/230V
3	–	X	–	5.0 KW, 208/230V
4	–	X	–	2.5 KW, 265V
5	–	X	–	5.0 KW, 265V
0	NO OPTIONS			

CABINET HEIGHT

OPTION	80"	88"	ISO PAD
A	–	X	–
B	X	–	–
C	–	X	X
D	X	–	X

REVISION LEVEL
A = CURRENT REVISION

STANDARD
0 = STANDARD
A, B, C etc.... = SPECIAL 1, 2, 3 etc....

T-STAT WHIP
0 = No Whip
1 = 15' whip
2 = 25' whip
3 = 35' whip

SIDE Discharge Air
0 = No Opening
1 = Right Opening
2 = Left Opening
3 = Right & Left Opening

BACK/FRONT/TOP Discharge Air
0 = No Opening
1 = Back Opening
2 = Front Opening
3 = Top Opening
4 = Back & Top Opening
5 = Front & Top Opening
6 = Back & Front Opening
7 = Back, Front & Top Opening

RISER CHASE
0 = None
2 = Chase

RISER: LOCATION
0 = None
1 = Shipped Separately (Risers, Cabinet, Chassis)
2 = Left Back
3 = Right Back
4 = Left Side
5 = Right Side
6 = Chassis ships in Cabinet (Riser Separate)

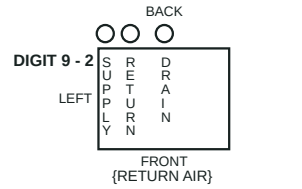
RISER STYLE
0 = SLAVE / NONE
1 = STANDARD
2 = MASTER

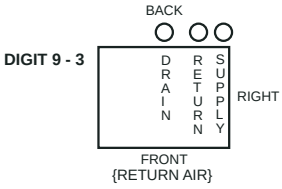
DISCHARGE OPENINGS BY UNIT SIZE 88"

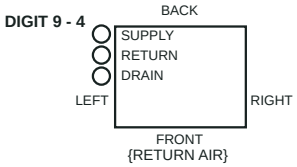
UNIT SIZE	Top	Back, Front & Side
09 thru 18	12" x 12"	12" x 6" & 12" x 12"
24 thru 36	16" x 16"	16" x 8" & 16" x 16"

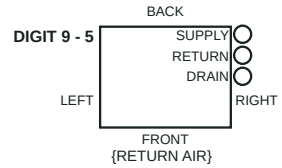
DISCHARGE OPENINGS BY UNIT SIZE 80"

UNIT SIZE	Top	Front
09 thru 18	12" x 12"	12" x 6"
24 thru 36	16" x 16"	16" x 6"









⚠ ATTENTION! ⚠

TSM has different riser configurations than TRM.
TSM chassis will not fit into the TRM Cabinet.
TSM return air side is defined as the front of unit.
TSM - G panel only.
TSM - All cabinets - field must remove supply air knockouts and install duct angles.

⚠ NOTICE! ⚠

Front of cabinet is return air side, risers can be on any other side (left, right, or back).

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TSM Series Nomenclature

Chassis

1 2 3	4 5	6	7	8	9	10	11	12	13	14	15
T S M	09	G	S	A	S	S	C	S	S	S	A

Series
TSM = TRANQUILITY®
HIGH RISE CHASSIS

Unit Size
09
12
15
18
24
30
36

Voltage
E = 265/60/1
G = 208-230/60/1

Chassis Options

OPTION	S.S. Drain Pan	ULTRAQUIET
A	X	–
B	–	X
C	X	X
S	–	–

Controls
A = CXM w/PSC
B = DXM2 w/ECM
C = DXM2 w/PSC
1 = CXM w/PSC w/EH
2 = DXM2 w/ECM w/EH
3 = DXM2 w/PSC w/EH

Water Valve & Pump Option
S = No Water valve
M = Standard Water Valve (Normally Closed)
P = Secondary Circulating Pump
T = Modulating Valve
U = UPM-Geo

AUTO-FLOW REGULATOR (US GPM) CODE

	5/8 SWEAT		7/8 SWEAT				
	UNIT 09	UNIT 12	UNIT 15	UNIT 18	UNIT 24	UNIT 30	UNIT 36
C	1.5	-	-	-	-	-	-
D	2.0	2.0	-	-	-	-	-
E	2.5	2.5	2.5	-	-	-	-
F	3.0	3.0	3.0	3.0	-	-	-
G	-	3.5	3.5	3.5	-	-	-
H	-	-	4.0	4.0	4.0	-	-
J	-	-	-	5.0	5.0	5.0	-
K		-	-	-	6.0	6.0	6.0
L	-	-	-	-	7.0	7.0	7.0
M	-	-	-	-	-	8.0	8.0
N	-	-	-	-	-	-	9.0
P	-	-	-	-	-	-	10.0

S = STANDARD - NO FLOW REGULATOR

Future Use
S = Standard

Shipping
6 = Chassis Will Ship In Cabinet (Risers Not Attached)
S = Standard

Heat Exchanger Options

Position 11	Tin Plated Air Coil		Non-Coated Air Coil	
	Copper	Cupro-nickel	Copper	Cupro-nickel
Standard Tubing	C	N	L	M
Insulated Tubing (Extended Range)	D	E	F	G

Standard
S = Standard
A = Special #1
B = Special #2
Etc.....

Revision Level
A = Current Revision Level

Chassis	Cabinet
09	C1
12	C2
15	C3
18	C4
24	C5
30	C6
36	C7

Hose Kit

1 2 3	4 5 6	7	8
AHH	0 5 0	3	B

Group
AHH = Accessory Hose Kit Hi-Rise

Hose Size
050 = 1/2" Nominal
075 = 3/4" Nominal
100 = 1" Nominal

Length
3 = Length in Feet

Revision Level
B = Current Revision

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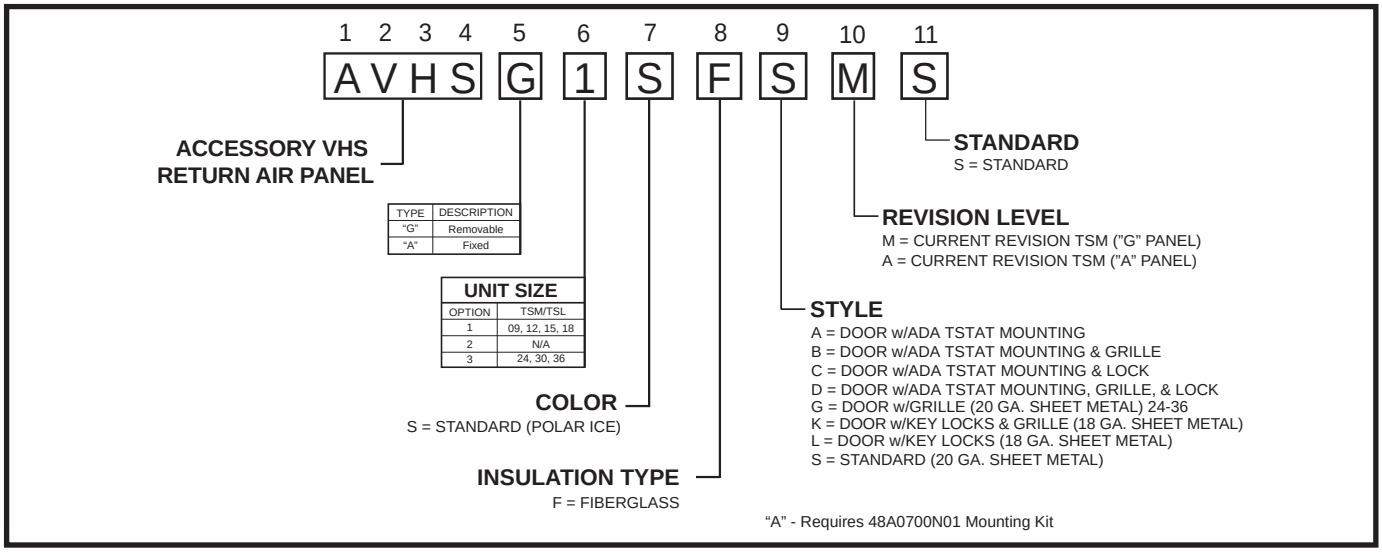
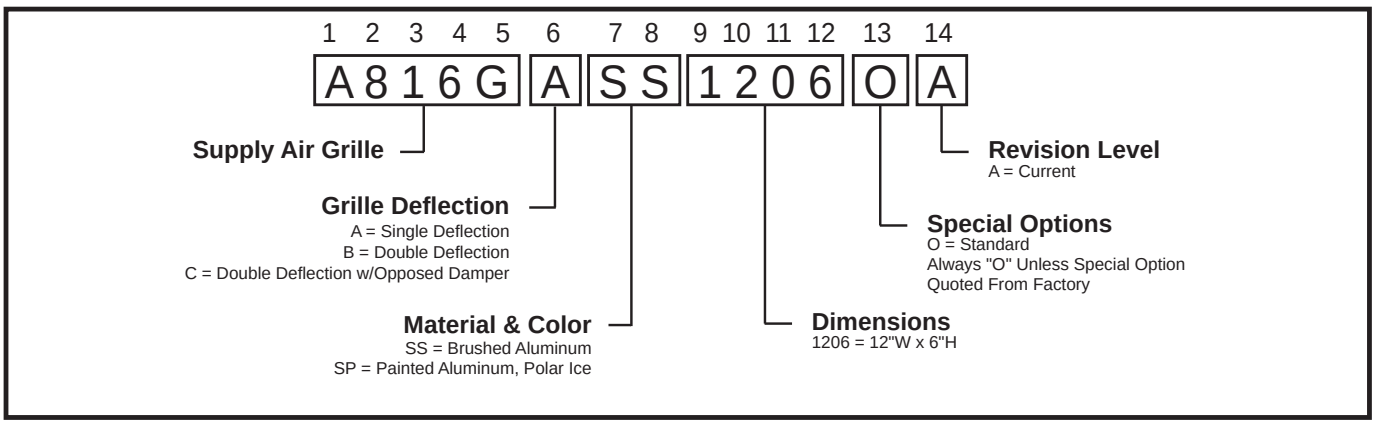
TSM Series Nomenclature

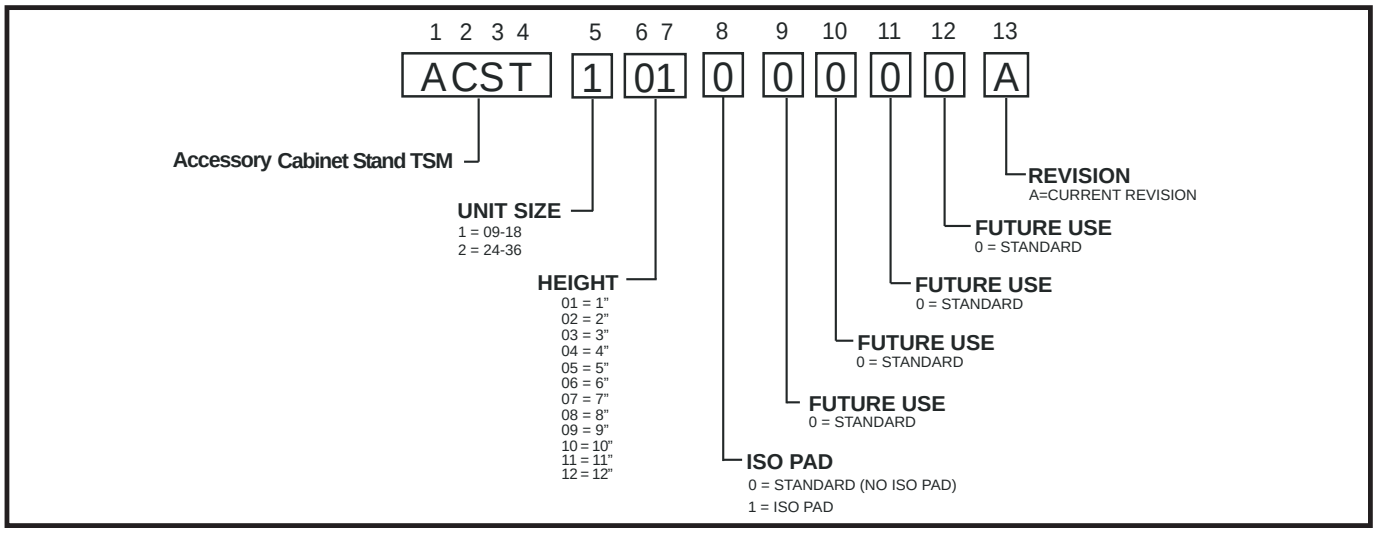
Return Air Panel


1 2 3 4 5 6 7 8 9 10 11
AVHS G 1 S F S M S
ACCESSORY VHS RETURN AIR PANEL
TYPE | DESCRIPTION
"G" | Removable
"A" | Fixed
UNIT SIZE
OPTION | TSM/TSL
1 | 09, 12, 15, 18
2 | N/A
3 | 24, 30, 36
COLOR
S = STANDARD (POLAR ICE)
INSULATION TYPE
F = FIBERGLASS
STYLE
A = DOOR w/ADA TSTAT MOUNTING
B = DOOR w/ADA TSTAT MOUNTING & GRILLE
C = DOOR w/ADA TSTAT MOUNTING & LOCK
D = DOOR w/ADA TSTAT MOUNTING, GRILLE, & LOCK
G = DOOR w/GRILLE (20 GA. SHEET METAL) 24-36
K = DOOR w/KEY LOCKS & GRILLE (18 GA. SHEET METAL)
L = DOOR w/KEY LOCKS (18 GA. SHEET METAL)
S = STANDARD (20 GA. SHEET METAL)
REVISION LEVEL
M = CURRENT REVISION TSM ("G" PANEL)
A = CURRENT REVISION TSM ("A" PANEL)
STANDARD
S = STANDARD
"A" - Requires 48A0700N01 Mounting Kit

Supply Air Grille


1 2 3 4 5 6 7 8 9 10 11 12 13 14
A816G A SS 1206 O A
Supply Air Grille
Grille Deflection
A = Single Deflection
B = Double Deflection
C = Double Deflection w/Opposed Damper
Material & Color
SS = Brushed Aluminum
SP = Painted Aluminum, Polar Ice
Dimensions
1206 = 12"W x 6"H
Special Options
O = Standard
Always "O" Unless Special Option
Quoted From Factory
Revision Level
A = Current

Cabinet Stands (Ship loose in bulk)



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Performance Data – AHRI/ASHRAE/ISO 13256-1

ASHRAE/AHRI/ISO 13256-1. English (I-P) Units

Model with ECM Motor	Water Loop Heat Pump				Ground Water Heat Pump				Ground Loop Heat Pump			
	Cooling 86°F		Heating 68°F		Cooling 59°F		Heating 50°F		Cooling 77°F		Heating 32°F	
	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP
TSM09	9,800	15.0	12,900	5.4	11,700	24.5	10,300	4.5	10,500	17.8	7,400	3.4
TSM12	11,600	14.7	16,000	5.2	13,600	23.8	12,900	4.4	12,300	17.2	9,600	3.4
TSM15	14,600	15.9	17,500	5.3	16,800	25.6	14,500	4.5	15,500	18.8	11,000	3.6
TSM18	18,000	15.2	22,200	5.1	20,000	23.5	17,700	4.4	18,500	17.3	13,200	3.3
TSM24	25,000	15.7	32,500	5.1	29,500	25.3	26,000	4.5	26,500	18.5	18,200	3.5
TSM30	28,000	15.1	34,500	5.0	31,500	22.9	28,500	4.4	29,000	17.6	22,200	3.6
TSM36	37,500	14.6	44,000	5.0	42,500	22.6	36,000	4.3	38,500	16.5	28,000	3.5

Model with PSC Motor	Water Loop Heat Pump				Ground Water Heat Pump				Ground Loop Heat Pump			
	Cooling 86°F		Heating 68°F		Cooling 59°F		Heating 50°F		Cooling 77°F		Heating 32°F	
	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP
TSM09	9,700	13.9	12,700	5.2	11,500	22.1	10,400	4.3	10,300	16.2	7,600	3.2
TSM12	11,400	13.8	16,000	5.1	13,500	21.8	13,000	4.3	12,200	16.0	9,700	3.3
TSM15	14,300	13.3	18,000	4.8	16,500	20.5	14,500	4.1	15,200	15.6	11,500	3.3
TSM18	17,300	13.2	22,500	4.8	20,000	20.0	18,000	4.0	18,400	15.1	13,500	3.2
TSM24	25,000	14.4	32,500	4.9	29,000	22.5	26,500	4.3	26,500	16.8	18,400	3.4
TSM30	27,500	13.4	34,500	4.7	31,000	19.5	28,500	4.1	28,500	15.2	22,000	3.3
TSM36	37,500	14.1	44,500	4.9	42,500	21.5	36,500	4.3	38,500	16.2	28,500	3.4

Cooling capacities based upon 80.6°F DB, 66.2°F WB entering air temperature
Heating capacities based upon 68°F DB, 59°F WB entering air temperature
All units AHRI/ISO/ASHRAE 13256-1 rated on high speed motor TAP
All ratings based upon operation at lower voltage of dual voltage rated models

ASHRAE/AHRI/ISO 13256-1. Metric (S-I) Units

Model with ECM Motor	Water Loop Heat Pump				Ground Water Heat Pump				Ground Loop Heat Pump			
	Cooling 30°C		Heating 20°C		Cooling 15°C		Heating 10°C		Cooling 25°C		Heating 0°C	
	Capacity kW	EER W/W	Capacity kW	COP	Capacity kW	EER W/W	Capacity kW	COP	Capacity kW	EER W/W	Capacity kW	COP
TSM09	2.87	4.4	3.78	5.4	3.37	7.2	3.02	4.5	3.08	5.2	2.17	3.4
TSM12	3.40	4.3	4.69	5.2	3.99	7.0	3.78	4.4	3.60	5.0	2.81	3.4
TSM15	4.28	4.7	5.13	5.3	4.92	7.5	4.25	4.5	4.54	5.5	3.22	3.6
TSM18	5.28	4.5	6.51	5.1	5.86	6.9	5.19	4.4	5.42	5.1	3.87	3.3
TSM24	7.33	4.6	9.53	5.1	8.65	7.4	7.62	4.5	7.77	5.4	5.33	3.5
TSM30	8.21	4.4	10.11	5.0	9.23	6.7	8.35	4.4	8.50	5.2	6.51	3.6
TSM36	10.99	4.3	12.90	5.0	12.46	6.6	10.55	4.3	11.28	4.8	8.21	3.5

Model with PSC Motor	Water Loop Heat Pump				Ground Water Heat Pump				Ground Loop Heat Pump			
	Cooling 30°C		Heating 20°C		Cooling 15°C		Heating 10°C		Cooling 25°C		Heating 0°C	
	Capacity kW	EER W/W	Capacity kW	COP	Capacity kW	EER W/W	Capacity kW	COP	Capacity kW	EER W/W	Capacity kW	COP
TSM09	2.84	4.1	3.72	5.2	3.37	6.5	3.05	4.3	3.02	4.8	2.23	3.2
TSM12	3.34	4.0	4.69	5.1	3.96	6.4	3.81	4.3	3.58	4.7	2.84	3.3
TSM15	4.19	3.9	5.28	4.8	4.84	6.0	4.25	4.1	4.45	4.6	3.37	3.3
TSM18	5.07	3.9	6.59	4.8	5.86	5.9	5.28	4.0	5.39	4.4	3.96	3.2
TSM24	7.33	4.2	9.53	4.9	8.50	6.6	7.77	4.3	7.77	4.9	5.39	3.4
TSM30	8.06	3.9	10.11	4.7	9.09	5.7	8.36	4.1	8.35	4.5	6.45	3.3
TSM36	10.99	4.1	13.04	4.9	12.46	6.3	10.70	4.3	11.28	4.7	8.35	3.4

Cooling capacities based upon 27°C DB, 19°C WB entering air temperature
Heating capacities based upon 20°C DB, 15°C WB entering air temperature
All units AHRI/ISO/ASHRAE 13256-1 rated on high speed motor TAP
All ratings based upon operation at lower voltage of dual voltage rated models

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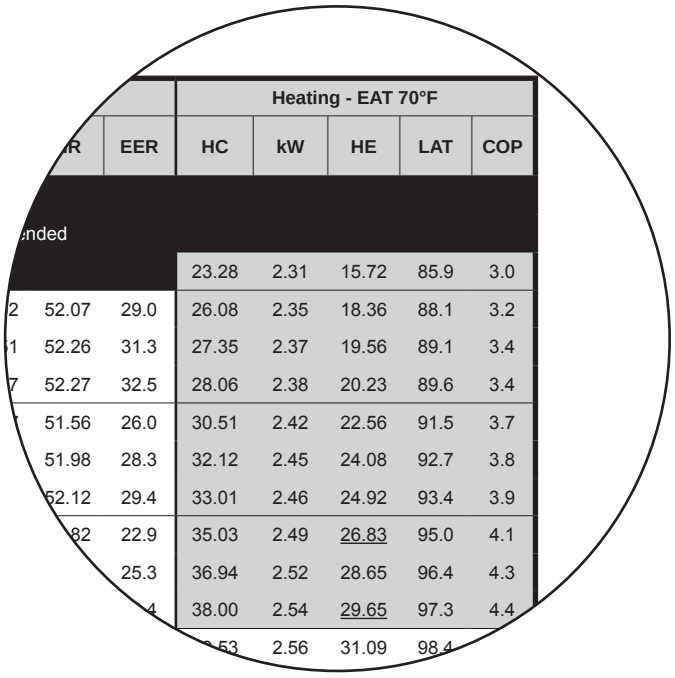
Performance Data – Selection Notes

For operation in the shaded area to determine if water can be used in lieu of an antifreeze solution, the Leaving Water Temperature (LWT) must be calculated. Flow must be maintained to a level such that the LWT is maintained above 42°F [5.6°C] when the CXM/DXM2 JW3 jumper is not clipped (see example below). Otherwise, appropriate levels (10° below LWT, See IOM) of a proper antifreeze should be used in systems with leaving water temperatures of 42°F [5.6°C] or below and the JW3 jumper should be clipped. This is due to the potential of the refrigerant temperature being as low as 32°F [0°C], which may lead to a nuisance cutout due to the activation of the Low Temperature Protection (LT1). JW3 should **never** be clipped for standard range equipment or systems without antifreeze.



			Heating - EAT 70°F				
	R	EER	HC	kW	HE	LAT	COP
nded							
			23.28	2.31	15.72	85.9	3.0
2	52.07	29.0	26.08	2.35	18.36	88.1	3.2
1	52.26	31.3	27.35	2.37	19.56	89.1	3.4
7	52.27	32.5	28.06	2.38	20.23	89.6	3.4
	51.56	26.0	30.51	2.42	22.56	91.5	3.7
	51.98	28.3	32.12	2.45	24.08	92.7	3.8
	52.12	29.4	33.01	2.46	24.92	93.4	3.9
	82	22.9	35.03	2.49	26.83	95.0	4.1
		25.3	36.94	2.52	28.65	96.4	4.3
		4	38.00	2.54	29.65	97.3	4.4
			53	2.56	31.09	98.4	

Example:

At 50°F EWT (Entering Water Temperature) and 1.5 gpm/ton, a 3 ton unit has a HE of 26,830 Btuh. To calculate LWT, rearrange the formula for HE as follows:

HE = TD x GPM x 500, where HE = Heat of Extraction (Btuh); TD = temperature difference (EWT - LWT) and GPM = U.S. Gallons per Minute.

TD = HE / (GPM x 500)

TD = 26,830 / (4.5 x 500)

TD = 12°F

LWT = EWT - TD

LWT = 50 - 12 = 38°F - Requires appropriate antifreeze (Protect to 28°F), JW3 must be clipped, and extended range insulation option.

In this example, a higher flow rate will be required for EWTs of 50°F without antifreeze. At 3 gpm/ton, the calculation becomes: (Note higher flow increases HE)

TD = 29,650 / (9GPMx500)

TD = 7°F

LWT = 50 - 7 = 43°F - Water is acceptable, do not clip JW3.

Performance Data Selection Notes – vFlow™ Models

Operation in Shaded Area: Closed Loop Application

For operation in the shaded area, appropriate levels of a proper antifreeze should be used in systems with leaving water temperatures of 40°F or below and the JW3 jumper should be clipped. This is due to the potential of the refrigerant temperature being as low as 32°F [0°C] with 40°F [4.4°C] LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for systems without antifreeze.

Open Loop Application:

For operation in shaded area (below 40°F LWT) in open loop applications, ΔT (on DXM2) should be set such that the LWT (=EWT - ΔT) doesn't drop below 40°F. JW3 should NEVER be clipped for systems without antifreeze.

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Performance Data – TSM09 with PSC Motor

400 CFM Nominal Airflow Heating, 350 CFM Nominal Airlfow Cooling

Performance capacities shown in thousands of Btuh

*WPD Adder for Motorized Valve, TSM09 (Cv = 3.0, MOPD =200 psi)		
GPM	WPD Adder	
	PSI	FT
1.5	0.3	0.6
2.3	0.6	1.3
3.0	1.0	2.3

EWT °F	GPM	WPD*		Cooling - EAT 80/67°F						Heating - EAT 70°F				
		PSI	FT	TC	SC	Sens/Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	1.5	1.6		Operation not recommended										
	2.3	1.8												
	3.0	5.7	13.2							6.33	0.65	3.96	75.6	2.8
30	1.5	1.1	2.6	13.08	9.05	0.69	0.41	14.61	32.5	7.36	0.66	4.95	76.9	3.2
	2.3	1.8	4.0	12.95	8.80	0.68	0.39	14.43	33.4	7.70	0.67	5.28	77.3	3.3
	3.0	4.7	10.7	12.82	8.63	0.67	0.39	14.29	33.5	7.89	0.67	5.46	77.5	3.4
40	1.5	0.8	1.9	12.97	9.21	0.71	0.44	14.64	29.6	8.84	0.68	6.39	78.7	3.8
	2.3	1.7	3.9	13.08	9.14	0.70	0.42	14.65	31.6	9.31	0.68	6.84	79.3	3.9
	3.0	4.1	9.6	13.08	9.06	0.69	0.41	14.62	32.4	9.57	0.68	7.09	79.6	4.0
50	1.5	0.5	1.1	12.59	9.16	0.73	0.49	14.42	25.9	10.39	0.69	7.89	80.6	4.4
	2.3	1.6	3.7	12.87	9.21	0.72	0.46	14.58	28.3	10.98	0.69	8.47	81.3	4.6
	3.0	3.6	8.4	12.97	9.21	0.71	0.44	14.63	29.5	11.31	0.69	8.79	81.7	4.7
60	1.5	0.4	1.0	12.00	8.95	0.75	0.55	14.03	22.1	11.95	0.70	9.42	82.5	5.0
	2.3	1.5	3.5	12.40	9.09	0.73	0.51	14.29	24.5	12.65	0.70	10.11	83.4	5.2
	3.0	4.0	9.3	12.57	9.15	0.73	0.49	14.41	25.8	13.04	0.70	10.49	83.9	5.4
70	1.5	0.4	0.9	11.28	8.64	0.77	0.61	13.52	18.6	13.50	0.71	10.94	84.4	5.5
	2.3	1.4	3.3	11.74	8.84	0.75	0.57	13.84	20.7	14.28	0.71	11.71	85.4	5.8
	3.0	3.0	7.0	11.96	8.93	0.75	0.55	14.00	21.9	14.71	0.71	12.13	85.9	6.0
80	1.5	0.3	0.8	10.46	8.27	0.79	0.68	12.94	15.6	14.98	0.71	12.40	86.3	6.1
	2.3	1.3	3.1	10.95	8.49	0.78	0.64	13.29	17.3	15.81	0.72	13.22	87.3	6.4
	3.0	3.1	7.1	11.20	8.60	0.77	0.62	13.46	18.3	16.24	0.72	13.65	87.8	6.6
90	1.5	0.3	0.7	9.61	7.87	0.82	0.75	12.33	12.9	16.36	0.72	13.76	88.0	6.6
	2.3	1.5	3.5	10.09	8.10	0.80	0.71	12.68	14.4	17.18	0.72	14.57	89.0	6.9
	3.0	3.1	7.2	10.34	8.21	0.79	0.69	12.86	15.2	17.58	0.72	14.98	89.5	7.1
100	1.5	0.1	0.2	8.76	7.49	0.86	0.83	11.73	10.8	Operation not recommended				
	2.3	1.2	2.9	9.21	7.69	0.84	0.79	12.05	11.9					
	3.0	2.8	6.4	9.45	7.80	0.83	0.77	12.22	12.5					
110	1.5	0.1	0.2	7.96	7.16	0.90	0.90	11.18	9.0					
	2.3	1.2	2.8	8.36	7.32	0.88	0.86	11.45	9.9					
	3.0	2.7	6.2	8.57	7.41	0.86	0.84	11.60	10.3					
120	1.5	0.1	0.2	7.26	6.93	0.95	0.97	10.72	7.6					
	2.3	1.2	2.7	7.59	7.03	0.93	0.94	10.93	8.3					
	3.0	2.6	6.0	7.77	7.09	0.91	0.92	11.05	8.6					

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
See performance correction tables for operating conditions other than those listed above.
See Performance Data Selection Notes for operation in the shaded areas.

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Performance Data – TSM12 with PSC Motor

500 CFM Nominal Airflow Heating, 400 CFM Nominal Airlfow Cooling

Performance capacities shown in thousands of Btuh

EWT °F	GPM	WPD*		Cooling - EAT 80/67°F						Heating - EAT 70°F				
		PSI	FT	TC	SC	Sens/Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	1.8	4.1		Operation not recommended										
	2.6	6.3												
	3.5	9.4	21.7							8.00	0.79	5.31	82.8	3.0
30	1.8	3.4	7.9	15.44	9.92	0.64	0.45	16.96	34.6	9.12	0.81	6.36	84.9	3.3
	2.6	5.6	13.0	15.49	9.88	0.64	0.41	16.89	37.6	9.56	0.82	6.77	85.7	3.4
	3.5	7.8	18.0	15.46	9.83	0.64	0.40	16.81	39.0	9.81	0.82	7.00	86.1	3.5
40	1.8	2.9	6.6	15.13	9.86	0.65	0.51	16.86	29.9	10.87	0.84	8.01	88.1	3.8
	2.6	4.9	11.4	15.36	9.92	0.65	0.47	16.95	32.9	11.47	0.85	8.57	89.2	4.0
	3.5	6.2	14.4	15.44	9.92	0.64	0.45	16.96	34.5	11.81	0.85	8.89	89.8	4.0
50	1.8	2.3	5.3	14.59	9.65	0.66	0.57	16.55	25.4	12.73	0.87	9.77	91.5	4.3
	2.6	4.2	9.8	14.96	9.80	0.65	0.53	16.77	28.2	13.49	0.88	10.49	92.9	4.5
	3.5	7.7	17.8	15.11	9.85	0.65	0.51	16.85	29.7	13.92	0.88	10.90	93.7	4.6
60	1.8	2.3	5.3	13.89	9.35	0.67	0.65	16.10	21.4	14.64	0.89	11.59	95.1	4.8
	2.6	4.1	9.5	14.34	9.55	0.67	0.60	16.40	23.8	15.55	0.90	12.47	96.7	5.0
	3.5	5.9	13.6	14.56	9.64	0.66	0.58	16.53	25.1	16.07	0.91	12.96	97.7	5.2
70	1.8	2.2	5.2	13.07	8.97	0.69	0.73	15.56	17.9	16.56	0.92	13.44	98.6	5.3
	2.6	4.0	9.1	13.57	9.21	0.68	0.68	15.90	19.9	17.61	0.93	14.44	100.5	5.6
	3.5	6.2	14.3	13.82	9.32	0.67	0.66	16.06	21.1	18.19	0.93	15.00	101.6	5.7
80	1.8	2.1	4.9	12.17	8.54	0.70	0.81	14.95	15.0	18.45	0.94	15.26	102.1	5.8
	2.6	3.9	8.9	12.70	8.80	0.69	0.76	15.31	16.6	19.59	0.95	16.36	104.2	6.1
	3.5	5.6	13.0	12.97	8.93	0.69	0.74	15.49	17.5	20.20	0.95	16.96	105.3	6.2
90	1.8	2.1	4.8	11.25	8.09	0.72	0.90	14.33	12.5	20.26	0.95	17.01	105.4	6.2
	2.6	3.7	8.7	11.77	8.34	0.71	0.85	14.68	13.8	21.43	0.96	18.15	107.6	6.5
	3.5	5.5	12.7	12.04	8.48	0.70	0.83	14.86	14.5	22.04	0.97	18.75	108.7	6.7
100	1.8	1.9	4.4	10.34	7.63	0.74	1.00	13.73	10.4	Operation not recommended				
	2.6	3.4	7.8	10.82	7.87	0.73	0.95	14.05	11.4					
	3.5	5.4	12.4	11.08	8.00	0.72	0.92	14.22	12.0					
110	1.8	1.8	4.2	9.48	7.19	0.76	1.09	13.20	8.7					
	2.6	3.3	7.7	9.91	7.41	0.75	1.04	13.46	9.5					
	3.5	5.3	12.2	10.14	7.53	0.74	1.02	13.61	10.0					
120	1.8	1.8	4.1	8.71	6.82	0.78	1.19	12.76	7.3					
	2.6	3.3	7.5	9.07	6.99	0.77	1.14	12.96	8.0					
	3.5	5.2	11.9	9.27	7.09	0.76	1.11	13.08	8.3					

*WPD Adder for Motorized Valve, TSM12 (Cv = 3.0, MOPD =200 psi)		
GPM	WPD Adder	
	PSI	FT
1.8	0.3	0.8
2.6	0.8	1.7
3.5	1.4	3.1

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
See performance correction tables for operating conditions other than those listed above.
See Performance Data Selection Notes for operation in the shaded areas.

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Performance Data – TSM15 with PSC Motor

*WPD Adder for Motorized Valve, TSM15 (Cv = 4.7, MOPD = 200 psi)		
GPM	WPD Adder	
	PSI	FT
2.3	0.2	0.5
3.4	0.5	1.2
4.5	0.9	2.1

600 CFM Nominal (Rated) Airflow

Performance capacities shown in thousands of Btuh

EWT °F	GPM	WPD*		Cooling - EAT 80/67°F						Heating - EAT 70°F				
		PSI	FT	TC	SC	Sens/Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	2.3	2.4		Operation not recommended										
	3.5	5.8												
	4.5	8.8	20.3							8.99	0.98	6.15	81.8	2.7
30	2.3	2.3	5.4	17.43	11.10	0.64	0.65	19.15	26.6	10.44	1.01	7.51	84.1	3.0
	3.5	5.0	11.6	16.92	10.50	0.62	0.63	18.56	26.9	10.91	1.02	7.95	84.8	3.1
	4.5	8.3	19.2	16.60	10.17	0.61	0.62	18.20	26.9	11.16	1.02	8.19	85.2	3.2
40	2.3	2.2	5.1	17.82	11.84	0.66	0.72	19.75	24.9	12.41	1.04	9.37	87.1	3.5
	3.5	4.3	9.8	17.67	11.46	0.65	0.68	19.47	26.0	12.98	1.05	9.91	88.0	3.6
	4.5	7.7	17.8	17.52	11.23	0.64	0.66	19.27	26.5	13.29	1.05	10.21	88.5	3.7
50	2.3	2.1	4.8	17.69	12.22	0.69	0.79	19.87	22.4	14.34	1.07	11.20	90.1	3.9
	3.5	4.2	9.7	17.82	12.04	0.68	0.74	19.85	23.9	15.01	1.08	11.84	91.1	4.1
	4.5	7.1	16.4	17.83	11.91	0.67	0.72	19.79	24.6	15.38	1.09	12.18	91.7	4.2
60	2.3	2.1	4.9	17.17	12.30	0.72	0.88	19.64	19.6	16.24	1.10	13.01	93.0	4.3
	3.5	4.2	9.7	17.52	12.29	0.70	0.82	19.81	21.3	17.00	1.11	13.73	94.2	4.5
	4.5	7.0	16.1	17.65	12.24	0.69	0.80	19.86	22.1	17.41	1.11	14.12	94.8	4.6
70	2.3	2.0	4.7	16.36	12.13	0.74	0.97	19.16	16.9	18.09	1.12	14.78	95.9	4.7
	3.5	4.2	9.6	16.85	12.26	0.73	0.91	19.46	18.4	18.93	1.13	15.58	97.1	4.9
	4.5	6.9	15.8	17.08	12.29	0.72	0.89	19.59	19.3	19.38	1.14	16.01	97.8	5.0
80	2.3	2.0	4.5	15.34	11.77	0.77	1.07	18.49	14.3	19.89	1.14	16.51	98.6	5.1
	3.5	4.0	9.2	15.93	11.99	0.75	1.01	18.88	15.7	20.80	1.15	17.39	100.0	5.3
	4.5	6.6	15.3	16.21	12.09	0.75	0.98	19.06	16.5	21.28	1.15	17.85	100.8	5.4
90	2.3	1.9	4.4	14.19	11.25	0.79	1.18	17.71	12.0	21.63	1.16	18.20	101.3	5.5
	3.5	3.9	9.0	14.82	11.55	0.78	1.12	18.14	13.2	22.59	1.16	19.14	102.8	5.7
	4.5	6.6	15.3	15.14	11.68	0.77	1.09	18.35	13.9	23.10	1.16	19.64	103.6	5.8
100	2.3	1.9	4.4	12.97	10.63	0.82	1.30	16.89	10.0	Operation not recommended				
	3.5	3.9	8.9	13.61	10.96	0.81	1.24	17.31	11.0					
	4.5	6.5	15.0	13.93	11.12	0.80	1.21	17.53	11.5					
110	2.3	1.9	4.4	11.74	9.95	0.85	1.42	16.06	8.3					
	3.5	3.9	8.9	12.34	10.28	0.83	1.36	16.46	9.1					
	4.5	6.4	14.8	12.65	10.46	0.83	1.33	16.67	9.5					
120	2.3	1.9	4.4	10.56	9.25	0.88	1.54	15.30	6.9					
	3.5	3.8	8.8	11.10	9.57	0.86	1.48	15.64	7.5					
	4.5	6.3	14.6	11.38	9.74	0.86	1.45	15.83	7.8					

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
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Performance Data – TSM18 with PSC Motor

685 CFM Nominal (Rated) Airflow

Performance capacities shown in thousands of Btuh

EWT °F	GPM	WPD*		Cooling - EAT 80/67°F						Heating - EAT 70°F				
		PSI	FT	TC	SC	Sens/Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	3.4	2.6		Operation not recommended										
	5.1	4.7												
	6.8	7.2	16.7							10.67	1.18	7.16	82.1	2.7
30	3.4	2.2	5.1	23.79	15.72	0.66	0.77	25.90	31.0	12.64	1.21	9.01	84.7	3.1
	5.1	4.2	9.7	23.88	15.52	0.65	0.73	25.85	32.8	13.10	1.22	9.45	85.3	3.1
	6.8	6.7	15.4	23.89	15.38	0.64	0.71	25.79	33.7	13.36	1.23	9.69	85.6	3.2
40	3.4	1.9	4.3	23.35	15.80	0.68	0.85	25.75	27.3	15.18	1.26	11.41	88.0	3.5
	5.1	3.8	8.7	23.61	15.81	0.67	0.81	25.86	29.2	15.79	1.27	11.98	88.8	3.7
	6.8	5.4	12.5	23.71	15.77	0.67	0.79	25.89	30.1	16.12	1.27	12.29	89.3	3.7
50	3.4	1.5	3.5	22.61	15.55	0.69	0.95	25.33	23.8	17.78	1.30	13.87	91.5	4.0
	5.1	3.3	7.7	23.01	15.71	0.68	0.90	25.57	25.6	18.53	1.31	14.57	92.5	4.1
	6.8	4.4	10.0	23.19	15.76	0.68	0.88	25.67	26.5	18.93	1.31	14.96	93.0	4.2
60	3.4	1.5	3.3	21.63	15.06	0.70	1.05	24.70	20.6	20.40	1.34	16.36	94.9	4.5
	5.1	2.9	6.6	22.13	15.32	0.69	1.00	25.03	22.1	21.29	1.35	17.20	96.1	4.6
	6.8	4.3	9.9	22.37	15.44	0.69	0.97	25.19	23.0	21.77	1.36	17.66	96.7	4.7
70	3.4	1.4	3.2	20.45	14.40	0.70	1.16	23.91	17.6	23.04	1.37	18.87	98.4	4.9
	5.1	2.4	5.5	21.03	14.73	0.70	1.11	24.30	19.0	24.07	1.39	19.85	99.8	5.1
	6.8	4.2	9.6	21.31	14.89	0.70	1.08	24.49	19.7	24.62	1.39	20.38	100.5	5.2
80	3.4	1.1	2.4	19.13	13.65	0.71	1.29	23.01	14.9	25.68	1.41	21.38	101.9	5.3
	5.1	2.6	6.0	19.75	14.01	0.71	1.23	23.43	16.1	26.83	1.42	22.49	103.4	5.5
	6.8	4.1	9.5	20.06	14.18	0.71	1.20	23.65	16.7	27.45	1.43	23.08	104.2	5.6
90	3.4	1.1	2.5	17.71	12.86	0.73	1.42	22.04	12.5	28.29	1.44	23.89	105.3	5.8
	5.1	2.8	6.6	18.35	13.21	0.72	1.36	22.47	13.5	29.56	1.45	25.11	107.0	6.0
	6.8	4.0	9.3	18.67	13.39	0.72	1.33	22.69	14.0	30.24	1.46	25.76	107.9	6.1
100	3.4	1.1	2.5	16.22	12.07	0.74	1.56	21.04	10.4	Operation not recommended				
	5.1	2.2	5.0	16.85	12.40	0.74	1.50	21.46	11.2					
	6.8	3.6	8.4	17.17	12.57	0.73	1.47	21.68	11.7					
110	3.4	1.0	2.2	14.70	11.30	0.77	1.72	20.06	8.5					
	5.1	2.1	4.9	15.31	11.60	0.76	1.66	20.45	9.2					
	6.8	3.5	8.2	15.62	11.76	0.75	1.62	20.65	9.6					
120	3.4	1.0	2.2	13.19	10.58	0.80	1.89	19.13	7.0					
	5.1	2.1	4.7	13.76	10.85	0.79	1.83	19.48	7.5					
	6.8	3.5	8.0	14.06	10.99	0.78	1.79	19.66	7.8					

*WPD Adder for Motorized Valve, TSM18 (Cv =4.7, MOPD = 200 psi)		
GPM	WPD Adder	
	PSI	FT
3.4	0.5	1.2
5.1	1.2	2.7
6.8	2.1	4.8

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
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Performance Data – TSM24 with PSC Motor

850 CFM Nominal (Rated) Airflow

Performance capacities shown in thousands of Btuh

*WPD Adder for Motorized Valve, TSM24 (Cv = 7.4, MOPD = 200 psi)		
GPM	WPD Adder	
	PSI	FT
4.0	0.3	0.7
6.0	0.7	1.5
8.0	1.2	2.7

EWT °F	GPM	WPD*		Cooling - EAT 80/67°F						Heating - EAT 70°F				
		PSI	FT	TC	SC	Sens/Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	4.0	0.8		Operation not recommended										
	6.0	2.5												
	8.0	5.2	12.1							17.55	1.73	12.11	87.1	3.0
30	4.0	0.9	2.1	33.57	21.59	0.64	1.06	36.72	31.8	19.10	1.72	13.69	88.8	3.3
	6.0	2.3	5.3	34.11	21.76	0.64	0.99	37.03	34.4	19.80	1.72	14.39	89.5	3.4
	8.0	5.0	11.4	34.31	21.80	0.64	0.96	37.13	35.7	20.20	1.72	14.79	90.0	3.4
40	4.0	0.7	1.6	32.53	21.15	0.65	1.16	36.03	28.0	21.81	1.73	16.37	91.7	3.7
	6.0	2.3	5.2	33.29	21.48	0.65	1.09	36.54	30.6	22.77	1.74	17.30	92.8	3.8
	8.0	4.6	10.7	33.62	21.61	0.64	1.05	36.75	32.0	23.31	1.74	17.82	93.3	3.9
50	4.0	0.5	1.1	31.23	20.51	0.66	1.28	35.13	24.4	24.83	1.76	19.27	95.0	4.1
	6.0	2.2	5.1	32.14	20.97	0.65	1.20	35.76	26.9	26.06	1.78	20.44	96.3	4.3
	8.0	4.3	9.9	32.57	21.17	0.65	1.16	36.05	28.2	26.75	1.79	21.10	97.1	4.4
60	4.0	0.4	1.0	29.72	19.72	0.66	1.42	34.11	20.9	28.05	1.82	22.32	98.5	4.5
	6.0	2.0	4.6	30.74	20.26	0.66	1.33	34.80	23.2	29.55	1.84	23.72	100.1	4.7
	8.0	4.0	9.3	31.23	20.51	0.66	1.28	35.14	24.4	30.38	1.86	24.49	101.0	4.8
70	4.0	0.4	0.9	28.06	18.82	0.67	1.59	33.02	17.7	31.39	1.88	25.43	102.1	4.9
	6.0	1.8	4.1	29.14	19.41	0.67	1.48	33.72	19.7	33.13	1.92	27.03	104.0	5.1
	8.0	3.8	8.7	29.67	19.70	0.66	1.43	34.08	20.8	34.08	1.94	27.91	105.0	5.1
80	4.0	0.3	0.7	26.31	17.83	0.68	1.78	31.93	14.7	34.76	1.96	28.53	105.8	5.2
	6.0	1.7	4.0	27.40	18.45	0.67	1.66	32.60	16.5	36.67	2.01	30.28	107.9	5.4
	8.0	3.5	8.1	27.96	18.76	0.67	1.60	32.95	17.5	37.70	2.03	31.23	109.0	5.4
90	4.0	0.3	0.7	24.51	16.80	0.69	2.01	30.92	12.2	38.05	2.04	31.54	109.4	5.5
	6.0	1.8	4.2	25.59	17.43	0.68	1.87	31.52	13.7	40.07	2.10	33.38	111.5	5.6
	8.0	3.2	7.4	26.15	17.74	0.68	1.80	31.84	14.5	41.13	2.12	34.34	112.7	5.7
100	4.0	0.3	0.6	22.72	15.77	0.69	2.28	30.05	9.9	Operation not recommended				
	6.0	1.6	3.7	23.76	16.37	0.69	2.12	30.54	11.2					
	8.0	3.0	6.9	24.30	16.68	0.69	2.04	30.81	11.9					
110	4.0	0.2	0.5	21.00	14.77	0.70	2.60	29.41	8.1					
	6.0	1.6	3.7	21.96	15.33	0.70	2.42	29.74	9.1					
	8.0	2.9	6.7	22.47	15.62	0.70	2.33	29.95	9.7					
120	4.0	0.2	0.4	19.39	13.84	0.71	2.97	29.07	6.5					
	6.0	1.0	2.3	20.26	14.34	0.71	2.76	29.21	7.3					
	8.0	2.8	6.6	20.73	14.61	0.70	2.66	29.33	7.8					

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
See performance correction tables for operating conditions other than those listed above.
See Performance Data Selection Notes for operation in the shaded areas.

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Performance Data – TSM30 with PSC Motor

1000 CFM Nominal (Rated) Airflow

Performance capacities shown in thousands of Btuh

EWT °F	GPM	WPD*		Cooling - EAT 80/67°F						Heating - EAT 70°F				
		PSI	FT	TC	SC	Sens/Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	4.0	1.2		Operation not recommended										
	6.0	2.5												
	8.0	5.2	12.1							17.82	1.93	11.96	84.5	2.7
30	4.0	0.9	2.1	33.05	22.48	0.68	1.30	36.75	25.4	20.35	1.97	14.35	86.8	3.0
	6.0	2.3	5.3	32.29	21.97	0.68	1.23	35.77	26.2	21.25	1.99	15.20	87.6	3.1
	8.0	5.0	11.4	31.79	21.64	0.68	1.20	35.17	26.4	21.74	2.00	15.67	88.1	3.2
40	4.0	0.7	1.6	33.55	22.84	0.68	1.42	37.65	23.7	23.88	2.03	17.69	90.1	3.4
	6.0	2.3	5.2	33.34	22.68	0.68	1.34	37.19	24.8	24.96	2.05	18.71	91.1	3.6
	8.0	4.6	10.7	33.12	22.53	0.68	1.31	36.85	25.3	25.54	2.06	19.25	91.6	3.6
50	4.0	0.5	1.1	33.29	22.75	0.68	1.55	37.84	21.5	27.28	2.08	20.90	93.2	3.8
	6.0	2.2	5.1	33.53	22.85	0.68	1.46	37.79	22.9	28.49	2.10	22.05	94.3	4.0
	8.0	4.3	9.9	33.56	22.85	0.68	1.42	37.68	23.6	29.14	2.12	22.65	94.9	4.0
60	4.0	0.4	1.0	32.45	22.34	0.69	1.70	37.51	19.1	30.51	2.14	23.95	96.2	4.2
	6.0	2.0	4.6	33.04	22.63	0.68	1.60	37.76	20.7	31.79	2.16	25.16	97.4	4.3
	8.0	4.0	9.3	33.26	22.74	0.68	1.55	37.83	21.4	32.47	2.17	25.79	98.0	4.4
70	4.0	0.4	0.9	31.16	21.69	0.70	1.87	36.81	16.7	33.50	2.19	26.76	98.9	4.5
	6.0	1.8	4.1	32.01	22.11	0.69	1.76	37.28	18.2	34.79	2.21	27.97	100.1	4.6
	8.0	3.8	8.7	32.38	22.30	0.69	1.71	37.47	19.0	35.45	2.23	28.59	100.7	4.7
80	4.0	0.3	0.7	29.53	20.87	0.71	2.07	35.88	14.2	36.18	2.24	29.28	101.4	4.7
	6.0	1.7	4.0	30.56	21.38	0.70	1.95	36.47	15.7	37.40	2.26	30.42	102.5	4.8
	8.0	3.5	8.1	31.04	21.63	0.70	1.89	36.74	16.5	38.00	2.27	30.97	103.1	4.9
90	4.0	0.3	0.7	27.66	19.95	0.72	2.31	34.83	12.0	38.48	2.28	31.42	103.5	4.9
	6.0	1.8	4.2	28.79	20.50	0.71	2.17	35.46	13.3	39.53	2.31	32.40	104.5	5.0
	8.0	3.2	7.4	29.35	20.78	0.71	2.10	35.77	14.0	40.02	2.32	32.85	105.0	5.1
100	4.0	0.3	0.6	25.63	18.96	0.74	2.60	33.76	9.9	Operation not recommended				
	6.0	1.6	3.7	26.81	19.53	0.73	2.43	34.37	11.0					
	8.0	3.0	6.9	27.40	19.82	0.72	2.35	34.68	11.7					
110	4.0	0.2	0.5	23.53	17.95	0.76	2.93	32.79	8.0					
	6.0	1.6	3.7	24.70	18.51	0.75	2.74	33.31	9.0					
	8.0	2.9	6.7	25.30	18.80	0.74	2.65	33.60	9.6					
120	4.0	0.2	0.4	21.44	16.97	0.79	3.32	32.03	6.5					
	6.0	1.0	2.3	22.56	17.49	0.78	3.10	32.41	7.3					
	8.0	2.8	6.6	23.14	17.77	0.77	3.00	32.63	7.7					

*WPD Adder for Motorized Valve, TSM30 (Cv = 7.4, MOPD = 200 psi)		
GPM	WPD Adder	
	PSI	FT
4.0	0.3	0.7
6.0	0.7	1.5
8.0	1.2	2.7

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
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See Performance Data Selection Notes for operation in the shaded areas.

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Performance Data – TSM36 with PSC Motor

1200 CFM Nominal (Rated) Airflow

Performance capacities shown in thousands of Btuh

*WPD Adder for Motorized Valve, TSM36 (Cv = 7.4, MOPD = 200 psi)		
GPM	WPD Adder	
	PSI	FT
4.5	0.4	0.9
6.8	0.8	1.9
9.0	1.5	3.4

EWT °F	GPM	WPD*		Cooling - EAT 80/67°F						Heating - EAT 70°F				
		PSI	FT	TC	SC	Sens/Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	4.5	3.7		Operation not recommended										
	6.0	5.0												
	9.0	8.6	19.8							23.28	2.31	15.72	85.9	3.0
30	4.5	2.8	6.4	46.36	30.52	0.66	1.62	52.07	29.0	26.08	2.35	18.36	88.1	3.2
	6.0	3.8	8.8	46.90	30.81	0.66	1.51	52.26	31.3	27.35	2.37	19.56	89.1	3.4
	9.0	7.4	17.0	47.08	30.90	0.66	1.47	52.27	32.5	28.06	2.38	20.23	89.6	3.4
40	4.5	1.8	4.3	45.35	29.95	0.66	1.77	51.56	26.0	30.51	2.42	22.56	91.5	3.7
	6.0	2.6	5.9	46.16	30.41	0.66	1.65	51.98	28.3	32.12	2.45	24.08	92.7	3.8
	9.0	7.0	16.3	46.49	30.59	0.66	1.60	52.12	29.4	33.01	2.46	24.92	93.4	3.9
50	4.5	0.9	2.1	44.01	29.22	0.66	1.94	50.82	22.9	35.03	2.49	26.83	95.0	4.1
	6.0	2.4	5.6	45.06	29.79	0.66	1.80	51.40	25.3	36.94	2.52	28.65	96.4	4.3
	9.0	4.7	10.7	45.52	30.05	0.66	1.74	51.65	26.4	38.00	2.54	29.65	97.3	4.4
60	4.5	0.9	2.0	42.36	28.34	0.67	2.15	49.89	19.9	39.53	2.56	31.09	98.4	4.5
	6.0	2.3	5.3	43.62	29.01	0.67	1.99	50.60	22.2	41.72	2.60	33.15	100.1	4.7
	9.0	4.4	10.3	44.20	29.32	0.66	1.91	50.93	23.3	42.91	2.62	34.28	101.0	4.8
70	4.5	0.8	1.8	40.44	27.36	0.68	2.40	48.83	17.0	43.95	2.64	35.25	101.8	4.9
	6.0	2.2	5.1	41.88	28.09	0.67	2.21	49.62	19.2	46.34	2.69	37.48	103.7	5.1
	9.0	4.3	10.0	42.56	28.45	0.67	2.12	50.00	20.3	47.62	2.71	38.67	104.7	5.1
80	4.5	0.8	1.8	38.26	26.28	0.69	2.71	47.70	14.3	48.21	2.73	39.21	105.1	5.2
	6.0	2.1	4.9	39.85	27.06	0.68	2.48	48.52	16.3	50.69	2.78	41.50	107.0	5.3
	9.0	4.2	9.6	40.62	27.45	0.68	2.38	48.93	17.3	52.00	2.82	42.69	108.0	5.4
90	4.5	0.8	1.8	35.85	25.12	0.70	3.08	46.54	11.8	52.19	2.82	42.87	108.2	5.4
	6.0	2.1	4.9	37.57	25.94	0.69	2.81	47.35	13.5	54.65	2.90	45.08	110.1	5.5
	9.0	4.0	9.3	38.41	26.35	0.69	2.69	47.77	14.5	55.89	2.94	46.17	111.0	5.6
100	4.5	0.7	1.7	33.20	23.86	0.72	3.52	45.40	9.6	Operation not recommended				
	6.0	2.1	4.8	35.03	24.73	0.71	3.21	46.17	11.1					
	9.0	3.9	9.1	35.93	25.16	0.70	3.06	46.58	11.9					
110	4.5	0.7	1.5	30.35	22.50	0.74	4.04	44.33	7.6					
	6.0	2.0	4.6	32.28	23.42	0.73	3.68	45.03	8.9					
	9.0	3.9	8.9	33.23	23.87	0.72	3.51	45.41	9.6					
120	4.5	0.6	1.5	27.29	21.02	0.77	4.66	43.37	6.0					
	6.0	1.9	4.4	29.31	22.00	0.75	4.24	43.98	7.0					
	9.0	3.6	8.4	30.30	22.48	0.74	4.05	44.31	7.6					

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
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Performance Data – TSM09 with ECM Motor

400 CFM Nominal Airflow Heating, 350 CFM Nominal Airflow Cooling

Performance capacities shown in thousands of Btuh

EWT °F	GPM	WPD		Cooling - EAT 80/67°F						Heating - EAT 70°F				
		PSI	FT	TC	SC	Sens/Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	1.5	1.6		Operation not recommended										
	2.3	1.8												
	3.0	5.7	13.2							6.18	0.65	3.96	75.6	2.8
30	1.5	1.1	2.6	13.23	9.05	0.68	0.41	14.61	32.5	7.21	0.66	4.95	76.9	3.2
	2.3	1.8	4.0	13.10	8.80	0.67	0.39	14.43	33.4	7.55	0.67	5.28	77.3	3.3
	3.0	4.7	10.7	12.97	8.63	0.67	0.39	14.29	33.5	7.74	0.67	5.46	77.5	3.4
40	1.5	0.8	1.9	13.12	9.21	0.70	0.44	14.64	29.6	8.69	0.68	6.39	78.7	3.8
	2.3	1.7	3.9	13.23	9.14	0.69	0.42	14.65	31.6	9.16	0.68	6.84	79.3	3.9
	3.0	4.1	9.6	13.23	9.06	0.69	0.41	14.62	32.4	9.42	0.68	7.09	79.6	4.0
50	1.5	0.5	1.1	12.74	9.16	0.72	0.49	14.42	25.9	10.24	0.69	7.89	80.6	4.4
	2.3	1.6	3.7	13.02	9.21	0.71	0.46	14.58	28.3	10.83	0.69	8.47	81.3	4.6
	3.0	3.6	8.4	13.12	9.21	0.70	0.44	14.63	29.5	11.16	0.69	8.79	81.7	4.7
60	1.5	0.4	1.0	12.15	8.95	0.74	0.55	14.03	22.1	11.80	0.70	9.42	82.5	5.0
	2.3	1.5	3.5	12.55	9.09	0.72	0.51	14.29	24.5	12.50	0.70	10.11	83.4	5.2
	3.0	4.0	9.3	12.72	9.15	0.72	0.49	14.41	25.8	12.89	0.70	10.49	83.9	5.4
70	1.5	0.4	0.9	11.43	8.64	0.76	0.61	13.52	18.6	13.35	0.71	10.94	84.4	5.5
	2.3	1.4	3.3	11.89	8.84	0.74	0.57	13.84	20.7	14.13	0.71	11.71	85.4	5.8
	3.0	3.0	7.0	12.11	8.93	0.74	0.55	14.00	21.9	14.56	0.71	12.13	85.9	6.0
80	1.5	0.3	0.8	10.61	8.27	0.78	0.68	12.94	15.6	14.83	0.71	12.40	86.3	6.1
	2.3	1.3	3.1	11.10	8.49	0.76	0.64	13.29	17.3	15.66	0.72	13.22	87.3	6.4
	3.0	3.1	7.1	11.35	8.60	0.76	0.62	13.46	18.3	16.09	0.72	13.65	87.8	6.6
90	1.5	0.3	0.7	9.76	7.87	0.81	0.75	12.33	12.9	16.21	0.72	13.76	88.0	6.6
	2.3	1.5	3.5	10.24	8.10	0.79	0.71	12.68	14.4	17.03	0.72	14.57	89.0	6.9
	3.0	3.1	7.2	10.49	8.21	0.78	0.69	12.86	15.2	17.43	0.72	14.98	89.5	7.1
100	1.5	0.1	0.2	8.91	7.49	0.84	0.83	11.73	10.8	Operation not recommended				
	2.3	1.2	2.9	9.36	7.69	0.82	0.79	12.05	11.9					
	3.0	2.8	6.4	9.60	7.80	0.81	0.77	12.22	12.5					
110	1.5	0.1	0.2	8.11	7.16	0.88	0.90	11.18	9.0					
	2.3	1.2	2.8	8.51	7.32	0.86	0.86	11.45	9.9					
	3.0	2.7	6.2	8.72	7.41	0.85	0.84	11.60	10.3					
120	1.5	0.1	0.2	7.41	6.93	0.93	0.97	10.72	7.6					
	2.3	1.2	2.7	7.74	7.03	0.91	0.94	10.93	8.3					
	3.0	2.6	6.0	7.92	7.09	0.90	0.92	11.05	8.6					

***WPD Adder for Motorized Valve, TSM09 (Cv = 3.0, MOPD =200 psi)**

GPM	WPD Adder	
	PSI	FT
1.5	0.3	0.6
2.3	0.6	1.3
3.0	1.0	2.3

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
See performance correction tables for operating conditions other than those listed above.
See Performance Data Selection Notes for operation in the shaded areas.

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Performance Data – TSM12 with ECM Motor

500 CFM Nominal Airflow Heating, 400 CFM Nominal Airflow Cooling

Performance capacities shown in thousands of Btuh

*WPD Adder for Motorized Valve, TSM12 (Cv = 3.0, MOPD =200 psi)		
GPM	WPD Adder	
	PSI	FT
1.8	0.3	0.8
2.6	0.8	1.7
3.5	1.4	3.1

EWT °F	GPM	WPD		Cooling - EAT 80/67°F						Heating - EAT 70°F				
		PSI	FT	TC	SC	Sens/Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	1.8	4.1		Operation not recommended										
	2.7	6.3												
	3.5	9.4	21.7							7.76	0.77	5.13	83.9	2.9
30	1.8	3.4	7.9	15.67	10.25	0.65	0.41	17.07	38.2	8.92	0.79	6.23	86.3	3.3
	2.7	5.6	13.0	15.78	10.15	0.64	0.37	17.05	42.4	9.25	0.79	6.54	87.0	3.4
	3.5	7.8	18.0	15.79	10.06	0.64	0.35	17.00	44.5	9.43	0.80	6.71	87.4	3.5
40	1.8	2.9	6.6	15.30	10.23	0.67	0.47	16.92	32.2	10.50	0.81	7.72	89.6	3.8
	2.7	4.9	11.4	15.56	10.27	0.66	0.43	17.04	36.0	10.92	0.82	8.12	90.4	3.9
	3.5	6.2	14.4	15.66	10.25	0.65	0.41	17.07	38.0	11.16	0.83	8.34	90.9	4.0
50	1.8	2.3	5.3	14.74	10.05	0.68	0.54	16.60	27.1	12.11	0.84	9.24	92.9	4.2
	2.7	4.2	9.8	15.12	10.18	0.67	0.50	16.82	30.3	12.62	0.85	9.71	93.9	4.3
	3.5	7.7	17.8	15.28	10.23	0.67	0.48	16.91	32.1	12.90	0.86	9.97	94.5	4.4
60	1.8	2.3	5.3	14.04	9.75	0.69	0.62	16.16	22.7	13.72	0.87	10.74	96.2	4.6
	2.7	4.1	9.5	14.49	9.95	0.69	0.57	16.45	25.3	14.30	0.89	11.28	97.4	4.7
	3.5	5.9	13.6	14.71	10.04	0.68	0.55	16.58	26.8	14.62	0.89	11.57	98.0	4.8
70	1.8	2.2	5.2	13.23	9.37	0.71	0.70	15.62	18.9	15.30	0.91	12.21	99.4	4.9
	2.7	4.0	9.1	13.73	9.60	0.70	0.65	15.95	21.1	15.93	0.92	12.79	100.7	5.1
	3.5	6.2	14.3	13.98	9.72	0.70	0.63	16.12	22.3	16.27	0.93	13.11	101.4	5.2
80	1.8	2.1	4.9	12.35	8.94	0.72	0.78	15.02	15.8	16.81	0.94	13.61	102.5	5.3
	2.7	3.9	8.9	12.87	9.19	0.71	0.73	15.38	17.5	17.47	0.95	14.23	103.9	5.4
	3.5	5.6	13.0	13.14	9.32	0.71	0.71	15.56	18.5	17.82	0.96	14.56	104.6	5.5
90	1.8	2.1	4.8	11.43	8.49	0.74	0.87	14.40	13.1	18.22	0.96	14.93	105.4	5.5
	2.7	3.7	8.7	11.95	8.74	0.73	0.82	14.75	14.5	18.88	0.98	15.55	106.8	5.7
	3.5	5.5	12.7	12.22	8.87	0.73	0.80	14.93	15.3	19.22	0.98	15.87	107.5	5.7
100	1.8	1.9	4.4	10.50	8.05	0.77	0.96	13.78	10.9	Operation not recommended				
	2.7	3.4	7.8	11.00	8.29	0.75	0.91	14.11	12.1					
	3.5	5.4	12.4	11.26	8.41	0.75	0.89	14.29	12.7					
110	1.8	1.8	4.2	9.59	7.65	0.80	1.05	13.19	9.1					
	2.7	3.3	7.7	10.05	7.85	0.78	1.01	13.49	10.0					
	3.5	5.3	12.2	10.30	7.96	0.77	0.98	13.65	10.5					
120	1.8	1.8	4.1	8.74	7.29	0.83	1.15	12.66	7.6					
	2.7	3.3	7.5	9.15	7.46	0.82	1.10	12.91	8.3					
	3.5	5.2	11.9	9.37	7.55	0.81	1.08	13.05	8.7					

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
See performance correction tables for operating conditions other than those listed above.
See Performance Data Selection Notes for operation in the shaded areas.

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Performance Data – TSM15 with ECM Motor

600 CFM Nominal (Rated) Airflow

Performance capacities shown in thousands of Btuh

EWT °F	GPM	WPD		Cooling - EAT 80/67°F						Heating - EAT 70°F				
		PSI	FT	TC	SC	Sens/Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	2.3	2.4		Operation not recommended										
	3.5	5.8												
	4.5	8.8	20.3							8.69	0.83	6.15	81.8	3.2
30	2.3	2.3	5.4	17.43	11.10	0.64	0.50	19.15	34.5	10.14	0.86	7.51	84.1	3.6
	3.5	5.0	11.6	16.92	10.50	0.62	0.48	18.56	35.4	10.61	0.87	7.95	84.8	3.7
	4.5	8.3	19.2	16.60	10.17	0.61	0.47	18.20	35.5	10.86	0.87	8.19	85.2	3.8
40	2.3	2.2	5.1	17.82	11.84	0.66	0.57	19.75	31.5	12.11	0.89	9.37	87.1	4.1
	3.5	4.3	9.8	17.67	11.46	0.65	0.53	19.47	33.4	12.68	0.90	9.91	88.0	4.2
	4.5	7.7	17.8	17.52	11.23	0.64	0.51	19.27	34.2	12.99	0.90	10.21	88.5	4.3
50	2.3	2.1	4.8	17.69	12.22	0.69	0.64	19.87	27.7	14.04	0.92	11.20	90.1	4.6
	3.5	4.2	9.7	17.82	12.04	0.68	0.59	19.85	30.0	14.71	0.93	11.84	91.1	4.7
	4.5	7.1	16.4	17.83	11.91	0.67	0.57	19.79	31.1	15.08	0.94	12.18	91.7	4.8
60	2.3	2.1	4.9	17.17	12.30	0.72	0.73	19.64	23.7	15.94	0.95	13.01	93.0	5.0
	3.5	4.2	9.7	17.52	12.29	0.70	0.67	19.81	26.0	16.70	0.96	13.73	94.2	5.2
	4.5	7.0	16.1	17.65	12.24	0.69	0.65	19.86	27.2	17.11	0.96	14.12	94.8	5.3
70	2.3	2.0	4.7	16.36	12.13	0.74	0.82	19.16	20.0	17.79	0.97	14.78	95.9	5.5
	3.5	4.2	9.6	16.85	12.26	0.73	0.76	19.46	22.1	18.63	0.98	15.58	97.1	5.7
	4.5	6.9	15.8	17.08	12.29	0.72	0.74	19.59	23.2	19.08	0.99	16.01	97.8	5.8
80	2.3	2.0	4.5	15.34	11.77	0.77	0.92	18.49	16.6	19.59	0.99	16.51	98.6	5.9
	3.5	4.0	9.2	15.93	11.99	0.75	0.86	18.88	18.4	20.50	1.00	17.39	100.0	6.1
	4.5	6.6	15.3	16.21	12.09	0.75	0.83	19.06	19.4	20.98	1.00	17.85	100.8	6.2
90	2.3	1.9	4.4	14.19	11.25	0.79	1.03	17.71	13.8	21.33	1.01	18.20	101.3	6.3
	3.5	3.9	9.0	14.82	11.55	0.78	0.97	18.14	15.3	22.29	1.01	19.14	102.8	6.5
	4.5	6.6	15.3	15.14	11.68	0.77	0.94	18.35	16.1	22.80	1.01	19.64	103.6	6.7
100	2.3	1.9	4.4	12.97	10.63	0.82	1.15	16.89	11.3	Operation not recommended				
	3.5	3.9	8.9	13.61	10.96	0.81	1.09	17.31	12.5					
	4.5	6.5	15.0	13.93	11.12	0.80	1.06	17.53	13.2					
110	2.3	1.9	4.4	11.74	9.95	0.85	1.27	16.06	9.3					
	3.5	3.9	8.9	12.34	10.28	0.83	1.21	16.46	10.2					
	4.5	6.4	14.8	12.65	10.46	0.83	1.18	16.67	10.8					
120	2.3	1.9	4.4	10.56	9.25	0.88	1.39	15.30	7.6					
	3.5	3.8	8.8	11.10	9.57	0.86	1.33	15.64	8.3					
	4.5	6.3	14.6	11.38	9.74	0.86	1.30	15.83	8.7					

***WPD Adder for Motorized Valve, TSM15 (Cv = 4.7, MOPD = 200 psi)**

GPM	WPD Adder	
	PSI	FT
2.3	0.2	0.5
3.4	0.5	1.2
4.5	0.9	2.1

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
See performance correction tables for operating conditions other than those listed above.
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Performance Data – TSM18 with ECM Motor

700 CFM Nominal (Rated) Airflow

Performance capacities shown in thousands of Btuh

*WPD Adder for Motorized Valve, TSM18 (Cv =4.7, MOPD = 200 psi)		
GPM	WPD Adder	
	PSI	FT
3.4	0.5	1.2
5.1	1.2	2.7
6.8	2.1	4.8

EWT °F	GPM	WPD		Cooling - EAT 80/67°F						Heating - EAT 70°F				
		PSI	FT	TC	SC	Sens/Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	3.4	2.6		Operation not recommended										
	5.1	4.7												
	6.8	7.2	16.7							10.67	1.03	7.16	82.1	3.0
30	3.4	2.2	5.1	23.79	15.72	0.66	0.62	25.90	38.5	12.64	1.06	9.01	84.7	3.5
	5.1	4.2	9.7	23.88	15.52	0.65	0.58	25.85	41.4	13.10	1.07	9.45	85.3	3.6
	6.8	6.7	15.4	23.89	15.38	0.64	0.56	25.79	42.8	13.36	1.08	9.69	85.6	3.6
40	3.4	1.9	4.3	23.35	15.80	0.68	0.70	25.75	33.2	15.18	1.11	11.41	88.0	4.0
	5.1	3.8	8.7	23.61	15.81	0.67	0.66	25.86	35.8	15.79	1.12	11.98	88.8	4.1
	6.8	5.4	12.5	23.71	15.77	0.67	0.64	25.89	37.2	16.12	1.12	12.29	89.3	4.2
50	3.4	1.5	3.5	22.61	15.55	0.69	0.80	25.33	28.3	17.78	1.15	13.87	91.5	4.5
	5.1	3.3	7.7	23.01	15.71	0.68	0.75	25.57	30.7	18.53	1.16	14.57	92.5	4.7
	6.8	4.4	10.0	23.19	15.76	0.68	0.73	25.67	31.9	18.93	1.16	14.96	93.0	4.8
60	3.4	1.5	3.3	21.63	15.06	0.70	0.90	24.70	24.0	20.40	1.19	16.36	94.9	5.0
	5.1	2.9	6.6	22.13	15.32	0.69	0.85	25.03	26.0	21.29	1.20	17.20	96.1	5.2
	6.8	4.3	9.9	22.37	15.44	0.69	0.82	25.19	27.1	21.77	1.21	17.66	96.7	5.3
70	3.4	1.4	3.2	20.45	14.40	0.70	1.01	23.91	20.2	23.04	1.22	18.87	98.4	5.5
	5.1	2.4	5.5	21.03	14.73	0.70	0.96	24.30	21.9	24.07	1.24	19.85	99.8	5.7
	6.8	4.2	9.6	21.31	14.89	0.70	0.93	24.49	22.9	24.62	1.24	20.38	100.5	5.8
80	3.4	1.1	2.4	19.13	13.65	0.71	1.14	23.01	16.8	25.68	1.26	21.38	101.9	6.0
	5.1	2.6	6.0	19.75	14.01	0.71	1.08	23.43	18.3	26.83	1.27	22.49	103.4	6.2
	6.8	4.1	9.5	20.06	14.18	0.71	1.05	23.65	19.1	27.45	1.28	23.08	104.2	6.3
90	3.4	1.1	2.5	17.71	12.86	0.73	1.27	22.04	13.9	28.29	1.29	23.89	105.3	6.4
	5.1	2.8	6.6	18.35	13.21	0.72	1.21	22.47	15.2	29.56	1.30	25.11	107.0	6.6
	6.8	4.0	9.3	18.67	13.39	0.72	1.18	22.69	15.8	30.24	1.31	25.76	107.9	6.8
100	3.4	1.1	2.5	16.22	12.07	0.74	1.41	21.04	11.5	Operation not recommended				
	5.1	2.2	5.0	16.85	12.40	0.74	1.35	21.46	12.5					
	6.8	3.6	8.4	17.17	12.57	0.73	1.32	21.68	13.0					
110	3.4	1.0	2.2	14.70	11.30	0.77	1.57	20.06	9.3					
	5.1	2.1	4.9	15.31	11.60	0.76	1.51	20.45	10.2					
	6.8	3.5	8.2	15.62	11.76	0.75	1.47	20.65	10.6					
120	3.4	1.0	2.2	13.19	10.58	0.80	1.74	19.13	7.6					
	5.1	2.1	4.7	13.76	10.85	0.79	1.68	19.48	8.2					
	6.8	3.5	8.0	14.06	10.99	0.78	1.64	19.66	8.6					

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
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Performance Data – TSM24 with ECM Motor

850 CFM Nominal (Rated) Airflow

Performance capacities shown in thousands of Btuh

EWT °F	GPM	WPD		Cooling - EAT 80/67°F						Heating - EAT 70°F				
		PSI	FT	TC	SC	Sens/Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	4.0	3.9		Operation not recommended										
	6.0	2.5												
	8.0	5.2	12.1							17.55	1.60	12.11	87.1	3.2
30	4.0	0.9	2.1	33.57	21.59	0.64	0.92	36.72	36.4	19.10	1.59	13.69	88.8	3.5
	6.0	2.3	5.3	34.11	21.76	0.64	0.86	37.03	39.8	19.80	1.59	14.39	89.5	3.7
	8.0	5.0	11.4	34.31	21.80	0.64	0.83	37.13	41.6	20.20	1.59	14.79	90.0	3.7
40	4.0	0.7	1.6	32.53	21.15	0.65	1.03	36.03	31.7	21.81	1.59	16.37	91.7	4.0
	6.0	2.3	5.2	33.29	21.48	0.65	0.95	36.54	35.0	22.77	1.60	17.30	92.8	4.2
	8.0	4.6	10.7	33.62	21.61	0.64	0.92	36.75	36.7	23.31	1.61	17.82	93.3	4.2
50	4.0	0.5	1.1	31.23	20.51	0.66	1.15	35.13	27.3	24.83	1.63	19.27	95.0	4.5
	6.0	2.2	5.1	32.14	20.97	0.65	1.06	35.76	30.3	26.06	1.65	20.44	96.3	4.6
	8.0	4.3	9.9	32.57	21.17	0.65	1.02	36.05	31.9	26.75	1.66	21.10	97.1	4.7
60	4.0	0.4	1.0	29.72	19.72	0.66	1.29	34.11	23.1	28.05	1.68	22.32	98.5	4.9
	6.0	2.0	4.6	30.74	20.26	0.66	1.19	34.80	25.8	29.55	1.71	23.72	100.1	5.1
	8.0	4.0	9.3	31.23	20.51	0.66	1.15	35.14	27.3	30.38	1.73	24.49	101.0	5.2
70	4.0	0.4	0.9	28.06	18.82	0.67	1.45	33.02	19.3	31.39	1.75	25.43	102.1	5.3
	6.0	1.8	4.1	29.14	19.41	0.67	1.34	33.72	21.7	33.13	1.79	27.03	104.0	5.4
	8.0	3.8	8.7	29.67	19.70	0.66	1.29	34.08	23.0	34.08	1.81	27.91	105.0	5.5
80	4.0	0.3	0.7	26.31	17.83	0.68	1.65	31.93	16.0	34.76	1.82	28.53	105.8	5.6
	6.0	1.7	4.0	27.40	18.45	0.67	1.52	32.60	18.0	36.67	1.87	30.28	107.9	5.7
	8.0	3.5	8.1	27.96	18.76	0.67	1.46	32.95	19.1	37.70	1.90	31.23	109.0	5.8
90	4.0	0.3	0.7	24.51	16.80	0.69	1.88	30.92	13.0	38.05	1.91	31.54	109.4	5.8
	6.0	1.8	4.2	25.59	17.43	0.68	1.74	31.52	14.7	40.07	1.96	33.38	111.5	6.0
	8.0	3.2	7.4	26.15	17.74	0.68	1.67	31.84	15.7	41.13	1.99	34.34	112.7	6.1
100	4.0	0.3	0.6	22.72	15.77	0.69	2.15	30.05	10.6	Operation not recommended				
	6.0	1.6	3.7	23.76	16.37	0.69	1.99	30.54	12.0					
	8.0	3.0	6.9	24.30	16.68	0.69	1.91	30.81	12.7					
110	4.0	0.2	0.5	21.00	14.77	0.70	2.47	29.41	8.5					
	6.0	1.6	3.7	21.96	15.33	0.70	2.28	29.74	9.6					
	8.0	2.9	6.7	22.47	15.62	0.70	2.19	29.95	10.3					
120	4.0	0.2	0.4	19.39	13.84	0.71	2.84	29.07	6.8					
	6.0	1.0	2.3	20.26	14.34	0.71	2.62	29.21	7.7					
	8.0	2.8	6.6	20.73	14.61	0.70	2.52	29.33	8.2					

*WPD Adder for Motorized Valve, TSM24 (Cv = 7.4, MOPD = 200 psi)		
GPM	WPD Adder	
	PSI	FT
4.0	0.3	0.7
6.0	0.7	1.5
8.0	1.2	2.7

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
See performance correction tables for operating conditions other than those listed above.
See Performance Data Selection Notes for operation in the shaded areas.

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Performance Data – TSM30 with ECM Motor

1000 CFM Nominal (Rated) Airflow

Performance capacities shown in thousands of Btuh

*WPD Adder for Motorized Valve, TSM30 (Cv = 7.4, MOPD = 200 psi)		
GPM	WPD Adder	
	PSI	FT
4.0	0.3	0.7
6.0	0.7	1.5
8.0	1.2	2.7

EWT °F	GPM	WPD		Cooling - EAT 80/67°F						Heating - EAT 70°F				
		PSI	FT	TC	SC	Sens/Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	4.0	1.2		Operation not recommended										
	6.0	2.5												
	8.0	5.2	12.1							17.82	1.72	11.96	84.5	3.0
30	4.0	0.9	2.1	33.05	22.48	0.68	1.08	36.75	30.5	20.35	1.76	14.35	86.8	3.4
	6.0	2.3	5.3	32.29	21.97	0.68	1.02	35.77	31.7	21.25	1.77	15.20	87.6	3.5
	8.0	5.0	11.4	31.79	21.64	0.68	0.99	35.17	32.2	21.74	1.78	15.67	88.1	3.6
40	4.0	0.7	1.6	33.55	22.84	0.68	1.20	37.65	27.9	23.88	1.81	17.69	90.1	3.9
	6.0	2.3	5.2	33.34	22.68	0.68	1.13	37.19	29.6	24.96	1.83	18.71	91.1	4.0
	8.0	4.6	10.7	33.12	22.53	0.68	1.09	36.85	30.3	25.54	1.84	19.25	91.6	4.1
50	4.0	0.5	1.1	33.29	22.75	0.68	1.33	37.84	25.0	27.28	1.87	20.90	93.2	4.3
	6.0	2.2	5.1	33.53	22.85	0.68	1.25	37.79	26.9	28.49	1.89	22.05	94.3	4.4
	8.0	4.3	9.9	33.56	22.85	0.68	1.21	37.68	27.8	29.14	1.90	22.65	94.9	4.5
60	4.0	0.4	1.0	32.45	22.34	0.69	1.48	37.51	21.9	30.51	1.92	23.95	96.2	4.6
	6.0	2.0	4.6	33.04	22.63	0.68	1.38	37.76	23.9	31.79	1.95	25.16	97.4	4.8
	8.0	4.0	9.3	33.26	22.74	0.68	1.34	37.83	24.9	32.47	1.96	25.79	98.0	4.9
70	4.0	0.4	0.9	31.16	21.69	0.70	1.65	36.81	18.8	33.50	1.97	26.76	98.9	5.0
	6.0	1.8	4.1	32.01	22.11	0.69	1.54	37.28	20.7	34.79	2.00	27.97	100.1	5.1
	8.0	3.8	8.7	32.38	22.30	0.69	1.49	37.47	21.7	35.45	2.01	28.59	100.7	5.2
80	4.0	0.3	0.7	29.53	20.87	0.71	1.86	35.88	15.9	36.18	2.02	29.28	101.4	5.2
	6.0	1.7	4.0	30.56	21.38	0.70	1.73	36.47	17.7	37.40	2.05	30.42	102.5	5.4
	8.0	3.5	8.1	31.04	21.63	0.70	1.67	36.74	18.6	38.00	2.06	30.97	103.1	5.4
90	4.0	0.3	0.7	27.66	19.95	0.72	2.10	34.83	13.2	38.48	2.07	31.42	103.5	5.5
	6.0	1.8	4.2	28.79	20.50	0.71	1.95	35.46	14.7	39.53	2.09	32.40	104.5	5.5
	8.0	3.2	7.4	29.35	20.78	0.71	1.88	35.77	15.6	40.02	2.10	32.85	105.0	5.6
100	4.0	0.3	0.6	25.63	18.96	0.74	2.38	33.76	10.8	Operation not recommended				
	6.0	1.6	3.7	26.81	19.53	0.73	2.21	34.37	12.1					
	8.0	3.0	6.9	27.40	19.82	0.72	2.13	34.68	12.8					
110	4.0	0.2	0.5	23.53	17.95	0.76	2.71	32.79	8.7					
	6.0	1.6	3.7	24.70	18.51	0.75	2.52	33.31	9.8					
	8.0	2.9	6.7	25.30	18.80	0.74	2.43	33.60	10.4					
120	4.0	0.2	0.4	21.44	16.97	0.79	3.10	32.03	6.9					
	6.0	1.0	2.3	22.56	17.49	0.78	2.89	32.41	7.8					
	8.0	2.8	6.6	23.14	17.77	0.77	2.78	32.63	8.3					

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
See performance correction tables for operating conditions other than those listed above.
See Performance Data Selection Notes for operation in the shaded areas.

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Performance Data – TSM36 with ECM Motor

1200 CFM Nominal (Rated) Airflow

Performance capacities shown in thousands of Btuh

EWT °F	GPM	WPD		Cooling - EAT 80/67°F						Heating - EAT 70°F				
		PSI	FT	TC	SC	Sens/Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	4.5	3.7		Operation not recommended										
	6.0	5.0												
	9.0	8.6	19.8							23.28	2.22	15.72	85.9	3.1
30	4.5	2.8	6.4	46.26	30.11	0.65	1.53	51.50	30.2	26.08	2.26	18.36	88.1	3.4
	6.0	3.8	8.8	46.26	30.05	0.65	1.46	51.25	31.7	27.35	2.28	19.56	89.1	3.5
	9.0	7.4	17.0	46.01	29.82	0.65	1.40	50.77	33.0	28.06	2.29	20.23	89.6	3.6
40	4.5	1.8	4.3	45.73	29.87	0.65	1.68	51.44	27.3	30.51	2.33	22.56	91.5	3.8
	6.0	2.6	5.9	46.11	30.05	0.65	1.59	51.54	29.0	32.12	2.36	24.08	92.7	4.0
	9.0	7.0	16.3	46.29	30.11	0.65	1.51	51.45	30.6	33.01	2.37	24.92	93.4	4.1
50	4.5	0.9	2.1	44.61	29.29	0.66	1.85	50.92	24.1	35.03	2.40	26.83	95.0	4.3
	6.0	2.4	5.6	45.31	29.66	0.65	1.75	51.27	25.9	36.94	2.43	28.65	96.4	4.5
	9.0	4.7	10.7	45.84	29.93	0.65	1.65	51.49	27.7	38.00	2.45	29.65	97.3	4.5
60	4.5	0.9	2.0	43.02	28.46	0.66	2.06	50.04	20.9	39.53	2.47	31.09	98.4	4.7
	6.0	2.3	5.3	43.97	28.95	0.66	1.94	50.57	22.7	41.72	2.51	33.15	100.1	4.9
	9.0	4.4	10.3	44.79	29.38	0.66	1.82	51.01	24.6	42.91	2.53	34.28	101.0	5.0
70	4.5	0.8	1.8	41.06	27.44	0.67	2.31	48.94	17.8	43.95	2.55	35.25	101.8	5.1
	6.0	2.2	5.1	42.18	28.02	0.66	2.17	49.57	19.5	46.34	2.60	37.48	103.7	5.2
	9.0	4.3	10.0	43.23	28.56	0.66	2.03	50.16	21.3	47.62	2.62	38.67	104.7	5.3
80	4.5	0.8	1.8	38.78	26.29	0.68	2.62	47.71	14.8	48.21	2.64	39.21	105.1	5.4
	6.0	2.1	4.9	40.04	26.92	0.67	2.45	48.38	16.4	50.69	2.69	41.50	107.0	5.5
	9.0	4.2	9.6	41.25	27.54	0.67	2.29	49.05	18.0	52.00	2.73	42.69	108.0	5.6
90	4.5	0.8	1.8	36.27	25.06	0.69	2.99	46.46	12.1	52.19	2.73	42.87	108.2	5.6
	6.0	2.1	4.9	37.61	25.71	0.68	2.79	47.11	13.5	54.65	2.81	45.08	110.1	5.7
	9.0	4.0	9.3	38.93	26.37	0.68	2.60	47.79	15.0	55.89	2.85	46.17	111.0	5.8
100	4.5	0.7	1.7	33.58	23.77	0.71	3.43	45.27	9.8	Operation not recommended				
	6.0	2.1	4.8	34.97	24.43	0.70	3.19	45.86	11.0					
	9.0	3.9	9.1	36.35	25.10	0.69	2.97	46.50	12.2					
110	4.5	0.7	1.5	30.78	22.45	0.73	3.95	44.25	7.8					
	6.0	2.0	4.6	32.18	23.10	0.72	3.68	44.73	8.7					
	9.0	3.9	8.9	33.60	23.77	0.71	3.42	45.28	9.8					
120	4.5	0.6	1.5	27.92	21.12	0.76	4.57	43.50	6.1					
	6.0	1.9	4.4	29.31	21.77	0.74	4.25	43.83	6.9					
	9.0	3.6	8.4	30.73	22.42	0.73	3.96	44.23	7.8					

*WPD Adder for Motorized Valve, TSM36 (Cv = 7.4, MOPD = 200 psi)		
GPM	WPD Adder	
	PSI	FT
4.5	0.4	0.9
6.8	0.8	1.9
9.0	1.5	3.4

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
See performance correction tables for operating conditions other than those listed above.
See Performance Data Selection Notes for operation in the shaded areas.

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Performance Data – TSM09 with Modulating Valve or Variable Speed Pump

400 CFM Nominal Airflow Heating, 350 CFM Nominal Airflow Cooling

EWT °F	GPM	WPD		Cooling - EAT 80/67°F						GPM	WPD		Heating - EAT 70ºF					
		PSI	FT	TC	SC	kW	HR	EER	LWT		PSI	FT	HC	kW	HE	LAT	COP	LWT
20										3.0	5.7	13.2	6.18	0.65	3.96	75.6	2.8	17
30	1.0	0.7	1.6	13.10	9.16	0.45	14.62	29.4	60	1.5	1.1	2.5	7.21	0.66	4.95	76.9	3.2	23
	1.0	0.7	1.6	13.10	9.16	0.45	14.62	29.4	60	2.3	1.8	4.2	7.55	0.67	5.28	77.3	3.3	25
	1.0	0.7	1.6	13.10	9.16	0.45	14.62	29.4	60	3.0	4.7	10.9	7.74	0.67	5.46	77.5	3.4	26
40	1.5	1.4	3.3	13.10	9.16	0.45	14.62	29.4	60	1.5	0.8	1.8	8.69	0.68	6.39	78.7	3.8	31
	1.5	1.4	3.3	13.10	9.16	0.45	14.62	29.4	60	2.3	1.7	3.9	9.16	0.68	6.84	79.3	3.9	34
	1.5	1.4	3.3	13.10	9.16	0.45	14.62	29.4	60	3.0	4.1	9.5	9.42	0.68	7.09	79.6	4.0	35
50	1.5	0.5	1.1	12.74	9.12	0.49	14.42	25.9	69	1.5	0.5	1.1	10.24	0.69	7.89	91.6	4.4	39
	2.3	1.6	3.7	13.01	9.17	0.46	14.58	28.3	63	2.3	1.6	3.7	10.83	0.69	8.47	93.0	4.6	42
	2.9	3.6	8.4	13.10	9.16	0.45	14.62	29.4	60	3.0	3.6	8.4	11.12	0.69	8.75	93.7	4.7	44
60	1.5	0.4	1.0	12.16	8.93	0.55	14.03	22.1	79	1.5	0.4	1.0	11.80	0.70	9.42	95.3	5.0	47
	2.3	1.5	3.5	12.55	9.06	0.51	14.29	24.5	73	2.3	1.5	3.5	12.50	0.70	10.11	96.9	5.2	51
	3.0	4.0	9.3	12.72	9.11	0.49	14.40	25.7	70	3.0	4.0	9.3	12.89	0.70	10.49	97.8	5.4	53
70	1.5	0.4	0.9	11.43	8.63	0.62	13.53	18.6	88	1.5	0.4	0.9	13.35	0.71	10.94	98.8	5.5	55
	2.3	1.4	3.3	11.89	8.82	0.57	13.85	20.7	82	2.3	1.4	3.3	14.13	0.71	11.71	100.6	5.8	60
	3.0	3.0	7.0	12.11	8.91	0.55	14.00	21.9	79	3.0	3.0	7.0	14.56	0.71	12.13	101.6	6.0	62
80	1.5	0.3	0.8	10.61	8.27	0.69	12.95	15.5	97	1.5	0.3	0.8	14.83	0.71	12.40	102.3	6.1	63
	2.3	1.3	3.1	11.10	8.49	0.64	13.30	17.3	92	2.3	1.3	3.1	15.66	0.72	13.22	104.2	6.4	68
	3.0	3.1	7.1	11.27	8.56	0.63	13.41	17.9	90	2.7	3.1	7.1	15.95	0.72	13.50	104.8	6.5	70
90	1.5	0.3	0.7	9.75	7.89	0.76	12.34	12.9	106	1.4	0.2	0.5	15.95	0.72	13.50	104.8	6.5	70
	2.3	1.5	3.5	9.75	7.89	0.76	12.34	12.9	106	1.4	0.2	0.5	15.95	0.72	13.50	104.8	6.5	70
	3.0	3.1	7.2	9.75	7.89	0.76	12.34	12.9	106	1.4	0.2	0.5	15.95	0.72	13.50	104.8	6.5	70
100	1.5	0.1	0.2	8.90	7.51	0.83	11.73	10.7	116	0.9	0.1	0.2	15.95	0.72	13.50	104.8	6.5	70
	2.3	1.2	2.9	9.35	7.71	0.79	12.06	11.8	111	0.9	0.1	0.2	15.95	0.72	13.50	104.8	6.5	70
	3.0	2.8	6.4	9.59	7.82	0.77	12.23	12.4	108	0.9	0.1	0.2	15.95	0.72	13.50	104.8	6.5	70
110	1.5	0.1	0.2	8.10	7.16	0.90	11.18	9.0	125	0.7	0.1	0.2	15.95	0.72	13.50	104.8	6.5	70
	2.3	1.2	2.8	8.50	7.33	0.87	11.45	9.8	120	0.7	0.1	0.2	15.95	0.72	13.50	104.8	6.5	70
	3.0	2.7	6.2	8.71	7.42	0.85	11.60	10.3	118	0.7	0.1	0.2	15.95	0.72	13.50	104.8	6.5	70
120	1.5	0.1	0.2	7.39	6.91	0.97	10.70	7.6	134	0.5	0.1	0.2	15.95	0.72	13.50	104.8	6.5	70
	2.3	1.2	2.7	7.72	7.02	0.94	10.92	8.2	130	0.5	0.1	0.2	15.95	0.72	13.50	104.8	6.5	70
	3.0	2.6	6.0	7.90	7.09	0.92	11.04	8.6	127	0.5	0.1	0.2	15.95	0.72	13.50	104.8	6.5	70

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
See performance correction tables for operating conditions other than those listed above.
See Performance Data Selection Notes for operation in the shaded areas.
Water Pressure drop adder for modulating pump option see table on page 37.

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Performance Data – TSM12 with Modulating Valve or Variable Speed Pump

400 CFM Nominal Airflow Heating, 500 CFM Nominal Airflow Cooling

EWT °F	GPM	WPD		Cooling - EAT 80/67°F						GPM	WPD		Heating - EAT 70ºF					
		PSI	FT	TC	SC	kW	HR	EER	LWT		PSI	FT	HC	kW	HE	LAT	COP	LWT
20										3.5	9.4	21.7	7.76	0.77	5.13	83.9	2.9	17
	1.1	1.1	2.6	15.10	9.86	0.51	16.85	29.6	60	1.8	3.4	7.9	8.92	0.79	6.23	86.3	3.3	23
30	1.1	1.1	2.6	15.10	9.86	0.51	16.85	29.6	60	2.6	5.6	12.9	9.25	0.79	6.54	87.0	3.4	25
	1.1	1.1	2.6	15.10	9.86	0.51	16.85	29.6	60	3.5	7.8	18.0	9.43	0.80	6.71	87.4	3.5	26
	1.7	2.3	5.3	15.10	9.86	0.51	16.85	29.6	60	1.8	2.9	6.7	10.50	0.81	7.72	89.6	3.8	31
40	1.7	2.3	5.3	15.10	9.86	0.51	16.85	29.6	60	2.6	4.9	11.3	10.92	0.82	8.12	90.4	3.9	34
	1.7	2.3	5.3	15.10	9.86	0.51	16.85	29.6	60	3.5	6.2	14.3	11.16	0.83	8.34	90.9	4.0	35
	1.8	2.3	5.3	14.58	9.66	0.58	16.55	25.3	69	1.8	2.3	5.3	12.74	0.87	9.77	91.5	4.3	39
50	2.6	4.2	9.7	14.95	9.81	0.53	16.77	28.1	63	2.6	4.2	9.7	13.49	0.88	10.49	92.9	4.5	42
	3.3	7.7	17.8	15.10	9.86	0.51	16.85	29.6	60	3.5	7.7	17.8	13.85	0.88	10.83	93.6	4.6	43
	1.8	2.3	5.3	13.87	9.34	0.65	16.09	21.3	78	1.8	2.3	5.3	14.64	0.89	11.59	95.0	4.8	47
60	2.6	4.1	9.5	14.33	9.55	0.60	16.39	23.8	73	2.6	4.1	9.5	15.54	0.90	12.46	96.7	5.0	50
	3.5	6.9	15.9	14.55	9.65	0.58	16.52	25.1	69	3.5	6.9	15.9	16.05	0.91	12.95	97.7	5.2	53
	1.8	2.2	5.2	13.04	8.95	0.73	15.53	17.9	88	1.8	2.2	5.2	16.55	0.92	13.42	98.6	5.3	55
70	2.6	4.0	9.1	13.55	9.20	0.68	15.87	19.9	82	2.6	4.0	9.1	17.58	0.93	14.42	100.5	5.6	59
	3.5	6.2	14.3	13.80	9.31	0.66	16.04	21.0	79	3.5	6.2	14.3	18.16	0.93	14.98	101.5	5.7	61
	1.8	2.1	4.9	12.14	8.51	0.81	14.92	14.9	97	1.8	2.1	4.9	18.42	0.93	15.23	102.0	5.8	63
80	2.6	3.9	8.9	12.67	8.77	0.76	15.28	16.6	92	2.6	3.9	8.9	19.55	0.95	16.33	104.1	6.1	68
	3.5	5.6	13.0	12.94	8.90	0.74	15.46	17.5	89	3.4	5.6	13.0	20.11	0.95	16.87	105.2	6.2	70
	1.8	2.1	4.8	11.20	8.05	0.90	14.29	12.4	106	1.7	1.8	4.2	20.11	0.95	16.87	105.2	6.2	70
90	2.6	3.7	8.7	11.72	8.31	0.85	14.64	13.7	101	1.7	1.8	4.2	20.11	0.95	16.87	105.2	6.2	70
	3.5	5.5	12.7	12.00	8.44	0.83	14.82	14.5	98	1.7	1.8	4.2	20.11	0.95	16.87	105.2	6.2	70
	1.8	1.9	4.4	10.28	7.60	1.00	13.68	10.3	116	1.1	0.5	1.2	20.11	0.95	16.87	105.2	6.2	70
100	2.6	3.4	7.8	10.77	7.84	0.95	14.00	11.4	111	1.1	0.5	1.2	20.11	0.95	16.87	105.2	6.2	70
	3.5	5.4	12.4	11.03	7.97	0.92	14.17	12.0	108	1.1	0.5	1.2	20.11	0.95	16.87	105.2	6.2	70
	1.8	1.8	4.2	9.41	7.18	1.09	13.13	8.6	125	0.8	0.1	0.2	20.11	0.95	16.87	105.2	6.2	70
110	2.6	3.3	7.7	9.84	7.39	1.04	13.40	9.4	120	0.8	0.1	0.2	20.11	0.95	16.87	105.2	6.2	70
	3.5	5.3	12.2	10.08	7.50	1.02	13.55	9.9	118	0.8	0.1	0.2	20.11	0.95	16.87	105.2	6.2	70
	1.8	1.8	4.1	8.63	6.84	1.19	12.70	7.2	135	0.7	0.1	0.2	20.11	0.95	16.87	105.2	6.2	70
120	2.6	3.3	7.5	8.99	7.00	1.14	12.89	7.9	130	0.7	0.1	0.2	20.11	0.95	16.87	105.2	6.2	70
	3.5	5.2	11.9	9.19	7.09	1.12	13.01	8.2	127	0.7	0.1	0.2	20.11	0.95	16.87	105.2	6.2	70

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
See performance correction tables for operating conditions other than those listed above.
See Performance Data Selection Notes for operation in the shaded areas.
Water Pressure drop adder for modulating pump option see table on page 37.

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Performance Data – TSM15 with Modulating Valve or Variable Speed Pump

600 CFM Nominal Airflow Heating, 600 CFM Nominal Airflow Cooling

EWT °F	GPM	WPD		Cooling - EAT 80/67°F						GPM	WPD		Heating - EAT 70ºF					
		PSI	FT	TC	SC	kW	HR	EER	LWT		PSI	FT	HC	kW	HE	LAT	COP	LWT
20										4.5	8.8	20.3	8.99	0.83	6.15	81.8	3.2	17
30	1.3	1.8	4.2	17.75	11.82	0.58	19.74	30.5	60	2.3	2.3	5.3	10.14	0.86	7.51	84.1	3.6	23
	1.3	1.8	4.2	17.75	11.82	0.58	19.74	30.5	60	3.5	5.0	11.6	10.61	0.87	7.95	84.8	3.7	25
	1.3	1.8	4.2	17.75	11.82	0.58	19.74	30.5	60	4.5	8.3	19.2	10.86	0.87	8.19	85.2	3.8	26
40	2.0	2.2	5.1	17.75	11.82	0.58	19.74	30.5	60	2.3	2.2	5.1	12.11	0.89	9.37	87.1	4.1	32
	2.0	2.2	5.1	17.75	11.82	0.58	19.74	30.5	60	3.5	4.3	9.9	12.68	0.90	9.91	88.0	4.2	34
	2.0	2.2	5.1	17.75	11.82	0.58	19.74	30.5	60	4.5	7.7	17.8	12.99	0.90	10.21	88.5	4.3	35
50	2.3	2.1	4.8	17.67	12.19	0.64	19.85	27.6	68	2.3	2.1	4.8	14.34	0.92	11.20	90.1	4.6	40
	3.5	4.2	9.7	17.75	11.90	0.59	19.77	30.0	61	3.5	4.2	9.7	15.06	0.93	11.89	91.2	4.7	43
	4.1	7.1	16.4	17.75	11.82	0.58	19.74	30.5	60	4.1	7.1	16.4	15.26	0.93	12.07	91.5	4.8	44
60	2.3	2.1	4.9	17.22	12.43	0.73	19.70	23.7	78	2.3	2.1	4.9	16.24	0.95	13.01	93.0	5.0	48
	3.5	4.2	9.7	17.54	12.32	0.67	19.83	26.1	71	3.5	4.2	9.7	17.06	0.96	13.79	94.3	5.2	52
	4.5	7.0	16.1	17.63	12.24	0.65	19.85	27.1	69	4.5	7.0	16.1	17.41	0.96	14.12	94.8	5.3	54
70	2.3	2.0	4.7	16.45	12.32	0.82	19.25	20.1	87	2.3	2.0	4.7	18.09	0.97	14.78	95.9	5.5	57
	3.5	4.2	9.6	16.97	12.43	0.76	19.57	22.3	81	3.5	4.2	9.6	18.99	0.98	15.64	97.2	5.7	61
	4.5	6.9	15.8	17.14	12.44	0.74	19.66	23.2	79	4.5	6.9	15.8	19.38	0.99	16.01	97.8	5.8	63
80	2.3	2.0	4.5	15.39	11.81	0.92	18.54	16.7	96	3.5	3.4	7.9	20.86	1.00	17.45	100.1	6.1	70
	3.5	4.0	9.2	16.07	12.16	0.86	19.00	18.7	91	3.5	3.4	7.9	20.86	1.00	17.45	100.1	6.1	70
	4.5	6.6	15.3	16.31	12.27	0.83	19.16	19.5	89	3.5	3.4	7.9	20.86	1.00	17.45	100.1	6.1	70
90	2.3	1.9	4.4	14.08	10.89	1.03	17.57	13.7	106	1.8	1.8	4.2	20.87	1.00	17.46	100.1	6.1	70
	3.5	3.9	9.0	14.87	11.47	0.96	18.16	15.4	100	1.8	1.8	4.2	20.87	1.00	17.46	100.1	6.1	70
	4.5	6.6	15.3	15.17	11.67	0.94	18.38	16.1	98	1.8	1.8	4.2	20.87	1.00	17.46	100.1	6.1	70
100	2.3	1.9	4.4	12.53	9.59	1.13	16.39	11.1	115	1.2	0.6	1.4	20.87	1.00	17.46	100.1	6.1	70
	3.5	3.9	8.9	13.39	10.34	1.07	17.06	12.5	110	1.2	0.6	1.4	20.87	1.00	17.46	100.1	6.1	70
	4.5	6.5	15.0	13.74	10.62	1.05	17.32	13.1	108	1.2	0.6	1.4	20.87	1.00	17.46	100.1	6.1	70
110	2.3	1.9	4.4	10.77	7.97	1.24	15.00	8.7	123	0.9	0.2	0.5	20.87	1.00	17.46	100.1	6.1	70
	3.5	3.9	8.9	11.67	8.81	1.19	15.72	9.8	119	0.9	0.2	0.5	20.87	1.00	17.46	100.1	6.1	70
	4.5	6.4	14.8	12.04	9.15	1.16	16.01	10.3	117	0.9	0.2	0.5	20.87	1.00	17.46	100.1	6.1	70
120	2.3	1.9	4.4	8.83	6.14	1.35	13.43	6.5	132	0.7	0.1	0.2	20.87	1.00	17.46	100.1	6.1	70
	3.5	3.8	8.8	9.73	6.98	1.30	14.16	7.5	128	0.7	0.1	0.2	20.87	1.00	17.46	100.1	6.1	70
	4.5	6.3	14.6	10.10	7.33	1.28	14.46	7.9	126	0.7	0.1	0.2	20.87	1.00	17.46	100.1	6.1	70

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
See performance correction tables for operating conditions other than those listed above.
See Performance Data Selection Notes for operation in the shaded areas.
Water Pressure drop adder for modulating pump option see table on page 37.

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Performance Data – TSM18 with Modulating Valve or Variable Speed Pump

700 CFM Nominal Airflow Heating, 700 CFM Nominal Airflow Cooling

EWT °F	GPM	WPD		Cooling - EAT 80/67°F						GPM	WPD		Heating - EAT 70ºF					
		PSI	FT	TC	SC	kW	HR	EER	LWT		PSI	FT	HC	kW	HE	LAT	COP	LWT
20										6.8	7.2	16.6	10.66	1.03	7.15	82.1	3.0	17.9
	1.7	0.3	0.7	22.88	15.85	0.75	25.43	30.5	60	3.4	2.2	5.1	11.47	1.04	7.91	83.1	3.2	21
30	1.7	0.3	0.7	22.88	15.85	0.75	25.43	30.5	60	5.1	4.2	9.7	11.47	1.04	7.91	83.1	3.2	21
	1.7	0.3	0.7	22.88	15.85	0.75	25.43	30.5	60	6.8	6.7	15.5	11.47	1.04	7.91	83.1	3.2	21
	2.6	0.4	0.9	22.88	15.85	0.75	25.43	30.5	60	3.4	1.9	4.4	14.65	1.10	10.91	87.3	3.9	31
40	2.6	0.4	0.9	22.88	15.85	0.75	25.43	30.5	60	5.1	3.8	8.8	14.65	1.10	10.91	87.3	3.9	31
	2.6	0.4	0.9	22.88	15.85	0.75	25.43	30.5	60	6.8	5.4	12.5	14.65	1.10	10.91	87.3	3.9	31
	3.4	0.5	1.2	22.46	15.70	0.80	25.18	28.2	60	3.4	1.5	3.5	17.82	1.14	13.92	91.5	4.6	42
50	5.1	1.7	3.9	22.87	15.84	0.75	25.43	30.5	60	5.1	3.3	7.6	18.57	1.15	14.64	92.5	4.7	44
	5.1	2.8	6.5	22.87	15.84	0.75	25.43	30.5	60	6.8	4.4	10.2	18.57	1.15	14.64	92.5	4.7	44
	3.4	1.5	3.5	21.49	15.22	0.90	24.56	23.8	74	3.4	1.5	3.5	20.46	1.18	16.43	95.0	5.1	50
60	5.1	2.9	6.7	21.99	15.48	0.85	24.88	25.9	70	5.1	2.9	6.7	21.35	1.19	17.29	96.2	5.3	53
	6.8	4.3	9.9	22.22	15.60	0.82	25.04	27.0	67	6.8	4.3	9.9	21.84	1.20	17.75	96.8	5.3	55
	3.4	1.4	3.2	20.34	14.55	1.01	23.80	20.1	84	3.4	1.4	3.2	23.10	1.22	18.95	98.5	5.6	59
70	5.1	2.4	5.5	20.90	14.89	0.96	24.17	21.8	79	5.1	2.4	5.5	24.13	1.23	19.93	99.8	5.8	62
	6.8	4.2	9.7	21.18	15.05	0.93	24.36	22.7	77	6.8	4.2	9.7	24.68	1.24	20.46	100.6	5.8	64
	3.4	1.1	2.5	19.06	13.78	1.14	22.93	16.8	93	3.4	1.1	2.5	25.72	1.25	21.45	101.9	6.0	67
80	5.1	2.6	6.0	19.66	14.14	1.08	23.34	18.2	91	4.5	2.2	5.1	26.52	1.26	22.21	103.0	6.2	70
	6.8	4.1	9.5	19.96	14.32	1.05	23.54	19.0	91	4.5	2.2	5.1	26.52	1.26	22.21	103.0	6.2	70
	3.4	1.1	2.5	17.67	12.95	1.27	22.00	13.9	110	2.2	2.0	4.6	26.52	1.26	22.21	103.0	6.2	70
90	5.1	2.8	6.5	18.29	13.31	1.21	22.42	15.1	110	2.2	2.0	4.6	26.52	1.26	22.21	103.0	6.2	70
	6.8	4.0	9.2	18.60	13.50	1.18	22.63	15.8	110	2.2	2.0	4.6	26.52	1.26	22.21	103.0	6.2	70
	3.4	1.1	2.5	16.21	12.12	1.42	21.04	11.5	112	1.5	0.9	2.1	26.52	1.26	22.21	103.0	6.2	70
100	5.1	2.2	5.1	16.83	12.46	1.35	21.45	12.4	108	1.5	0.9	2.1	26.52	1.26	22.21	103.0	6.2	70
	6.8	3.6	8.3	17.15	12.64	1.32	21.65	13.0	106	1.5	0.9	2.1	26.52	1.26	22.21	103.0	6.2	70
	3.4	1.0	2.3	14.70	11.31	1.57	20.07	9.4	122	1.1	0.5	1.2	26.52	1.26	22.21	103.0	6.2	70
110	5.1	2.1	4.9	15.31	11.63	1.51	20.46	10.2	118	1.1	0.5	1.2	26.52	1.26	22.21	103.0	6.2	70
	6.8	3.5	8.1	15.62	11.80	1.48	20.66	10.6	116	1.1	0.5	1.2	26.52	1.26	22.21	103.0	6.2	70
	3.4	1.0	2.3	13.19	10.56	1.74	19.13	7.6	131	0.9	0.2	0.5	26.52	1.26	22.21	103.0	6.2	70
120	5.1	2.1	4.9	13.77	10.84	1.68	19.48	8.2	128	0.9	0.2	0.5	26.52	1.26	22.21	103.0	6.2	70
	6.8	3.5	8.1	14.06	10.99	1.64	19.67	8.6	126	0.9	0.2	0.5	26.52	1.26	22.21	103.0	6.2	70

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
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Water Pressure drop adder for modulating pump option see table on page 37.

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Performance Data – TSM24 with Modulating Valve or Variable Speed Pump

850 CFM Nominal Airflow Heating, 850 CFM Nominal Airflow Cooling

EWT °F	GPM	WPD		Cooling - EAT 80/67°F						GPM	WPD		Heating - EAT 70ºF					
		PSI	FT	TC	SC	kW	HR	EER	LWT		PSI	FT	HC	kW	HE	LAT	COP	LWT
20										8.0	5.2	12.0	13.86	1.73	7.94	83.1	2.3	18.0
30	2.4	0.5	1.2	32.76	21.27	1.01	36.21	32.3	60	4.0	0.9	2.1	17.35	1.67	11.67	86.9	3.1	24
	2.4	0.5	1.2	32.76	21.27	1.01	36.21	32.3	60	6.0	2.3	5.3	18.24	1.65	12.60	87.8	3.2	26
	2.4	0.5	1.2	32.76	21.27	1.01	36.21	32.3	60	8.0	5.0	11.6	18.73	1.65	13.11	88.4	3.3	27
40	3.7	0.7	1.6	32.76	21.27	1.01	36.22	32.3	60	4.0	0.7	1.6	21.45	1.63	15.90	91.3	3.9	32
	3.7	0.7	1.6	32.76	21.27	1.01	36.22	32.3	60	6.0	2.3	5.3	22.57	1.63	17.02	92.5	4.1	34
	3.7	0.7	1.6	32.76	21.27	1.01	36.22	32.3	60	8.0	4.6	10.6	23.17	1.63	17.62	93.2	4.2	36
50	4.0	0.5	1.1	31.60	20.72	1.12	35.42	28.3	68	4.0	0.5	1.2	25.28	1.64	19.70	95.5	4.5	40
	6.0	2.2	5.1	32.45	21.13	1.04	36.01	31.2	62	6.0	2.2	5.1	26.56	1.65	20.94	96.9	4.7	43
	7.4	4.0	9.2	32.76	21.27	1.01	36.22	32.3	60	8.0	4.3	9.9	27.25	1.66	21.60	97.6	4.8	45
60	4.0	0.4	1.0	30.07	19.92	1.26	34.35	23.9	77	4.0	0.4	1.0	28.88	1.68	23.15	99.4	5.0	48
	6.0	2.0	4.6	30.98	20.40	1.17	34.98	26.4	72	6.0	2.0	4.6	30.29	1.71	24.46	100.9	5.2	52
	8.0	4.0	9.3	31.43	20.63	1.13	35.29	27.7	69	8.0	4.0	9.3	31.04	1.72	25.16	101.7	5.3	54
70	4.0	0.4	0.9	28.42	19.02	1.41	33.24	20.1	87	4.0	0.4	0.9	32.28	1.75	26.31	103.1	5.4	57
	6.0	1.8	4.1	29.36	19.54	1.32	33.87	22.2	81	6.0	1.8	4.1	33.81	1.79	27.70	104.7	5.5	61
	8.0	3.8	8.7	29.83	19.80	1.28	34.19	23.4	79	7.0	3.8	8.7	34.62	1.81	28.44	105.6	5.6	63
80	4.0	0.3	0.7	26.69	18.04	1.60	32.14	16.7	96	4.0	0.3	0.7	35.56	1.84	29.29	106.6	5.7	65
	6.0	1.7	4.0	27.64	18.58	1.49	32.74	18.5	91	6.0	1.7	4.0	37.21	1.89	30.78	108.4	5.8	70
	8.0	3.5	8.1	28.12	18.85	1.44	33.05	19.5	91	6.2	1.7	3.9	37.32	1.89	30.88	108.6	5.8	70
90	4.0	0.3	0.7	24.92	17.03	1.82	31.13	13.7	110	3.1	0.2	0.5	37.32	1.89	30.88	108.6	5.8	70
	6.0	1.8	4.2	25.86	17.56	1.70	31.65	15.2	110	3.1	0.2	0.5	37.32	1.89	30.88	108.6	5.8	70
	8.0	3.2	7.4	26.34	17.84	1.64	31.93	16.1	111	3.1	0.2	0.5	37.32	1.89	30.88	108.6	5.8	70
100	4.0	0.3	0.6	23.15	16.01	2.08	30.26	11.1	115	2.1	0.1	0.2	37.32	1.89	30.88	108.6	5.8	70
	6.0	1.6	3.7	24.06	16.53	1.94	30.68	12.4	110	2.1	0.1	0.2	37.32	1.89	30.88	108.6	5.8	70
	8.0	3.0	6.9	24.52	16.80	1.87	30.92	13.1	108	2.1	0.1	0.2	37.32	1.89	30.88	108.6	5.8	70
110	4.0	0.2	0.5	21.40	15.01	2.40	29.60	8.9	125	1.5	0.1	0.2	37.32	1.89	30.88	108.6	5.8	70
	6.0	1.6	3.7	22.27	15.50	2.24	29.90	10.0	120	1.5	0.1	0.2	37.32	1.89	30.88	108.6	5.8	70
	8.0	2.9	6.7	22.71	15.76	2.16	30.07	10.5	118	1.5	0.1	0.2	37.32	1.89	30.88	108.6	5.8	70
120	4.0	0.2	0.4	19.73	14.08	2.79	29.24	7.1	135	1.2	0.1	0.2	37.32	1.89	30.88	108.6	5.8	70
	6.0	1.0	2.3	20.54	14.53	2.59	29.38	7.9	130	1.2	0.1	0.2	37.32	1.89	30.88	108.6	5.8	70
	8.0	2.8	6.6	20.95	14.76	2.50	29.48	8.4	127	1.2	0.1	0.2	37.32	1.89	30.88	108.6	5.8	70

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
See performance correction tables for operating conditions other than those listed above.
See Performance Data Selection Notes for operation in the shaded areas.
Water Pressure drop adder for modulating pump option see table on page 37.

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Performance Data – TSM30 with Modulating Valve or Variable Speed Pump

1000 CFM Nominal Airflow Heating, 1000 CFM Nominal Airflow Cooling

EWT °F	GPM	WPD		Cooling - EAT 80/67°F						GPM	WPD		Heating - EAT 70ºF					
		PSI	FT	TC	SC	kW	HR	EER	LWT		PSI	FT	HC	kW	HE	LAT	COP	LWT
20										8.0	5.2	12.0	17.82	1.72	11.96	84.5	3.0	17
	2.5	0.5	1.1	33.42	22.73	1.22	37.56	27.5	60	4.0	0.9	2.1	18.94	1.74	13.02	85.5	3.2	20
30	2.5	0.5	1.1	33.42	22.73	1.22	37.56	27.5	60	6.0	2.3	5.3	18.94	1.74	13.02	85.5	3.2	20
	2.5	0.5	1.1	33.42	22.73	1.22	37.56	27.5	60	8.0	5.0	11.6	18.94	1.74	13.02	85.5	3.2	20
	3.8	0.7	1.6	33.42	22.73	1.22	37.56	27.5	60	4.0	0.7	1.6	23.68	1.81	17.50	89.9	3.8	31
40	3.8	0.7	1.6	33.42	22.73	1.22	37.56	27.5	60	6.0	2.3	5.3	23.68	1.81	17.50	89.9	3.8	31
	3.8	0.7	1.6	33.42	22.73	1.22	37.56	27.5	60	8.0	4.6	10.6	23.68	1.81	17.50	89.9	3.8	31
	4.0	0.5	1.1	33.35	22.92	1.33	37.89	25.0	69	4.0	0.5	1.2	27.28	1.87	20.90	93.2	4.3	40
50	6.0	2.2	5.1	33.47	22.83	1.25	37.72	26.8	63	6.0	2.2	5.1	28.49	1.89	22.05	94.3	4.4	43
	7.5	4.3	9.9	33.42	22.73	1.22	37.56	27.5	60	8.0	4.3	9.9	29.01	1.90	22.54	94.8	4.5	44
	4.0	0.4	1.0	32.55	22.62	1.48	37.60	21.9	79	4.0	0.4	0.9	30.51	1.92	23.95	96.2	4.6	48
60	6.0	2.0	4.6	33.13	22.86	1.39	37.85	23.9	73	6.0	2.0	4.6	31.79	1.95	25.16	97.4	4.8	52
	8.0	4.0	9.3	33.32	22.91	1.34	37.89	24.9	69	8.0	4.0	9.2	32.47	1.96	25.79	98.0	4.9	54
	4.0	0.4	0.9	31.19	21.95	1.66	36.85	18.8	88	4.0	0.4	0.9	33.50	1.97	26.76	98.9	5.0	57
70	6.0	1.8	4.1	32.09	22.41	1.55	37.36	20.8	82	6.0	1.8	4.2	34.79	2.00	27.97	100.1	5.1	61
	8.0	3.8	8.7	32.48	22.59	1.49	37.57	21.8	79	8.0	3.8	8.8	35.45	2.01	28.59	100.7	5.2	63
	4.0	0.3	0.7	29.46	21.03	1.86	35.81	15.8	98	4.0	0.3	0.7	36.18	2.02	29.28	101.4	5.2	65
80	6.0	1.7	4.0	30.55	21.61	1.73	36.46	17.6	92	6.1	1.8	4.2	37.43	2.05	30.44	102.6	5.4	70
	8.0	3.5	8.1	31.07	21.88	1.67	36.77	18.6	89	6.1	1.8	4.2	37.43	2.05	30.44	102.6	5.4	70
	4.0	0.3	0.7	27.50	19.98	2.10	34.67	13.1	107	3.1	0.3	0.7	37.43	2.05	30.44	102.6	5.4	70
90	6.0	1.8	4.2	28.68	20.61	1.95	35.34	14.7	102	3.1	0.3	0.7	37.43	2.05	30.44	102.6	5.4	70
	8.0	3.2	7.4	29.26	20.92	1.88	35.69	15.5	99	3.1	0.3	0.7	37.43	2.05	30.44	102.6	5.4	70
	4.0	0.3	0.6	25.45	18.90	2.38	33.57	10.7	117	2.0	0.2	0.5	37.43	2.05	30.44	102.6	5.4	70
100	6.0	1.6	3.7	26.62	19.52	2.21	34.18	12.0	111	2.0	0.2	0.5	37.43	2.05	30.44	102.6	5.4	70
	8.0	3.0	6.9	27.22	19.83	2.14	34.51	12.8	109	2.0	0.2	0.5	37.43	2.05	30.44	102.6	5.4	70
	4.0	0.2	0.5	23.44	17.89	2.71	32.69	8.6	126	1.5	0.1	0.2	37.43	2.05	30.44	102.6	5.4	70
110	6.0	1.6	3.7	24.54	18.43	2.52	33.14	9.7	121	1.5	0.1	0.2	37.43	2.05	30.44	102.6	5.4	70
	8.0	2.9	6.7	25.11	18.73	2.43	33.41	10.3	118	1.5	0.1	0.2	37.43	2.05	30.44	102.6	5.4	70
	4.0	0.2	0.4	21.61	17.07	3.11	32.21	7.0	136	1.2	0.1	0.2	37.43	2.05	30.44	102.6	5.4	70
120	6.0	1.0	2.3	22.56	17.48	2.88	32.41	7.8	131	1.2	0.1	0.2	37.43	2.05	30.44	102.6	5.4	70
	8.0	2.8	6.6	23.08	17.72	2.78	32.56	8.3	128	1.2	0.1	0.2	37.43	2.05	30.44	102.6	5.4	70

Interpolation is permissible; extrapolation is not.
All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.
AHRI/ISO certified conditions are 80.6°F DB and 66.2°F WB in cooling and 68°F DB in heating.
Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
All performance is based upon the lower voltage of dual voltage rated units.
Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
Operation below 40°F EWT is based upon a 15% methanol antifreeze solution.
Operation below 60°F EWT requires optional insulated water/refrigerant circuit.
See performance correction tables for operating conditions other than those listed above.
See Performance Data Selection Notes for operation in the shaded areas.
Water Pressure drop adder for modulating pump option see table on page 37.

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Performance Data – TSM36 with Modulating Valve or Variable Speed Pump

1200 CFM Nominal Airflow Heating, 1200 CFM Nominal Airflow Cooling

EWT °F	GPM	WPD		Cooling - EAT 80/67°F						GPM	WPD		Heating - EAT 70ºF					
		PSI	FT	TC	SC	kW	HR	EER	LWT		PSI	FT	HC	kW	HE	LAT	COP	LWT
20										9.0	8.6	19.9	23.28	2.22	15.72	85.9	3.1	17
	3.4	0.9	2.0	45.94	30.11	1.63	51.51	28.2	60	4.5	2.8	6.5	26.08	2.26	18.36	88.1	3.4	22
30	3.4	0.9	2.0	45.94	30.11	1.63	51.51	28.2	60	6.0	3.8	8.8	27.35	2.28	19.56	89.1	3.5	23
	3.4	0.9	2.0	45.94	30.11	1.63	51.51	28.2	60	9.0	7.4	17.1	28.06	2.29	20.23	89.6	3.6	26
	5.2	2.2	5.1	45.94	30.11	1.63	51.51	28.2	60	4.5	1.8	4.2	30.51	2.33	22.56	91.5	3.8	30
40	5.2	2.2	5.1	45.94	30.11	1.63	51.51	28.2	60	6.0	2.6	6.0	32.12	2.36	24.08	92.7	4.0	32
	5.2	2.2	5.1	45.94	30.11	1.63	51.51	28.2	60	9.0	7.0	16.2	33.01	2.37	24.92	93.4	4.1	34
	4.5	0.9	2.1	44.37	29.84	1.86	50.71	23.9	73	4.5	0.9	2.1	35.03	2.40	26.83	95.0	4.3	28
50	6.0	2.4	5.6	45.14	30.09	1.75	51.12	25.7	67	6.0	2.4	5.5	36.94	2.43	28.65	96.4	4.5	40
	9.0	4.7	10.7	45.79	30.13	1.66	51.44	27.6	61	9.0	4.7	10.9	38.00	2.45	29.65	97.3	4.5	43
	4.5	0.9	2.0	42.74	29.04	2.07	49.80	20.7	82	4.5	0.9	2.1	39.39	2.46	31.00	98.3	4.7	46
60	6.0	2.3	5.3	43.69	29.54	1.95	50.33	22.4	77	6.0	2.3	5.3	40.98	2.48	32.50	99.5	4.8	49
	9.0	4.4	10.3	44.55	29.91	1.83	50.81	24.3	71	9.0	4.4	10.2	42.71	2.51	34.13	100.9	5.0	52
	4.5	0.8	1.8	40.81	27.89	2.32	48.73	17.6	92	4.5	0.8	1.8	43.76	2.53	35.11	101.7	5.1	54
70	6.0	2.2	5.1	41.90	28.55	2.18	49.33	19.2	86	6.0	2.2	5.1	45.51	2.57	36.75	103.0	5.2	58
	9.0	4.3	10.0	42.94	29.14	2.04	49.91	21.0	81	9.0	4.3	9.9	47.40	2.61	38.50	104.5	5.3	61
	4.5	0.8	1.8	38.61	26.55	2.62	47.57	14.7	101	4.5	0.8	1.8	48.00	2.62	39.06	105.0	5.4	63
80	6.0	2.1	4.9	39.82	27.29	2.46	48.20	16.2	96	6.0	2.1	4.9	49.87	2.67	40.78	106.4	5.5	66
	9.0	4.2	9.6	40.98	28.00	2.30	48.83	17.8	91	8.5	4.1	9.5	51.61	2.71	42.36	107.7	5.6	70
	4.5	0.8	1.8	36.19	25.14	2.99	46.39	12.1	111	4.3	0.7	1.6	51.61	2.71	42.36	107.7	5.6	70
90	6.0	2.1	4.9	37.48	25.88	2.79	47.00	13.4	106	4.3	0.7	1.6	51.61	2.71	42.36	107.7	5.6	70
	9.0	4.0	9.3	38.75	26.64	2.61	47.64	14.9	101	4.3	0.7	1.6	51.61	2.71	42.36	107.7	5.6	70
	4.5	0.7	1.7	33.58	23.73	3.43	45.27	9.8	120	2.8	0.4	0.9	51.61	2.71	42.36	107.7	5.6	70
100	6.0	2.1	4.8	34.93	24.44	3.19	45.83	10.9	115	2.8	0.4	0.9	51.61	2.71	42.36	107.7	5.6	70
	9.0	3.9	9.1	36.27	25.18	2.98	46.43	12.2	110	2.8	0.4	0.9	51.61	2.71	42.36	107.7	5.6	70
	4.5	0.7	1.5	30.81	22.39	3.95	44.28	7.8	130	2.1	0.2	0.5	51.61	2.71	42.36	107.7	5.6	70
110	6.0	2.0	4.6	32.20	23.05	3.68	44.75	8.8	125	2.1	0.2	0.5	51.61	2.71	42.36	107.7	5.6	70
	9.0	3.9	8.9	33.59	23.74	3.42	45.28	9.8	120	2.1	0.2	0.5	51.61	2.71	42.36	107.7	5.6	70
	4.5	0.6	1.5	27.91	21.16	4.57	43.50	6.1	139	1.7	0.1	0.2	51.61	2.71	42.36	107.7	5.6	70
120	6.0	1.9	4.4	29.34	21.75	4.25	43.85	6.9	135	1.7	0.1	0.2	51.61	2.71	42.36	107.7	5.6	70
	9.0	3.6	8.4	30.76	22.37	3.96	44.27	7.8	130	1.7	0.1	0.2	51.61	2.71	42.36	107.7	5.6	70

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Performance Data Correction Tables

Air Flow Correction Table

Airflow	Cooling				Heating		
% of Nominal (Rated) SCFM	Total Capacity	Sensible Capacity	Power	Heat of Rejection	Heating Capacity	Power	Heat of Extraction
70	0.921	0.8	0.969	0.943	0.942	1.077	0.934
75	0.934	0.833	0.974	0.952	0.952	1.062	0.947
80	0.946	0.866	0.979	0.961	0.961	1.048	0.958
85	0.958	0.899	0.985	0.97	0.971	1.035	0.969
90	0.971	0.932	0.99	0.979	0.980	1.023	0.979
95	0.985	0.966	0.995	0.989	0.990	1.011	0.989
100	1.000	1.000	1.000	1.000	1.000	1.000	1.000
105	1.017	1.035	1.005	1.013	1.010	0.989	1.011

Entering Air Correction Table

Heating			
Entering Air DB°F	Heating Capacity	Power	Heat of Extraction
45	1.109	0.763	1.183
50	1.088	0.809	1.146
55	1.067	0.854	1.110
60	1.045	0.901	1.075
65	1.024	0.948	1.039
68	1.010	0.979	1.015
70	1.000	1.000	1.000
75	0.984	1.046	0.965
80	0.956	1.099	0.924

Cooling											
Ent. Air WB °F	Total Capacity	Sensible Capacity-Entering Air Dry Bulb, °F								Power	Heat of Rejection
		65	70	75	80	80.6	85	90	95		
45	0.557	*	*	*	*	*	*	*	*	0.986	0.672
50	0.658	1.100	*	*	*	*	*	*	*	0.989	0.747
55	0.758	0.861	1.091	*	*	*	*	*	*	0.992	0.821
60	0.859	0.623	0.854	1.091	1.325	1.383	*	*	*	0.996	0.896
65	0.960		0.617	0.857	1.093	1.151	1.326	*	*	0.999	0.970
66.2	0.984		0.561	0.801	1.037	1.095	1.270	1.521	*	1.000	0.988
67	1.000		0.523	0.763	1.000	1.058	1.232	1.482	*	1.000	1.000
70	1.060			0.623	0.861	0.919	1.090	1.339	1.563	1.002	1.045
75	1.161				0.629	0.686	0.854	1.101	1.318	1.005	1.119

* = Sensible capacity equals total capacity
AHRI/ISO/ASHRAE 13256-1 uses entering air conditions of Cooling - 80.6°F DB/66.2°F WB,
and Heating - 68°F DB/59°F WB entering air temperature

Antifreeze Correction Table

Antifreeze Type	Antifreeze %	Cooling			Heating		WPD Corr. Fct. EWT 30°F
		EWT 90°F			EWT 30°F		
		Total Cap	Sens Cap	Power	Htg Cap	Power	
Water	0	1.000	1.000	1.000	1.000		
Propylene Glycol	5	0.995	0.995	1.003	0.989	0.997	1.070
	15	0.986	0.986	1.009	0.968	0.990	1.210
	25	0.978	0.978	1.014	0.947	0.983	1.360
Methanol	5	0.997	0.997	1.002	0.989	0.997	1.070
	15	0.990	0.990	1.007	0.968	0.990	1.160
	25	0.982	0.982	1.012	0.949	0.984	1.220
Ethanol	5	0.998	0.998	1.002	0.981	0.994	1.140
	15	0.994	0.994	1.005	0.944	0.983	1.300
	25	0.986	0.986	1.009	0.917	0.974	1.360
Ethylene Glycol	5	0.998	0.998	1.002	0.993	0.998	1.040
	15	0.994	0.994	1.004	0.980	0.994	1.120
	25	0.988	0.988	1.008	0.966	0.990	1.200

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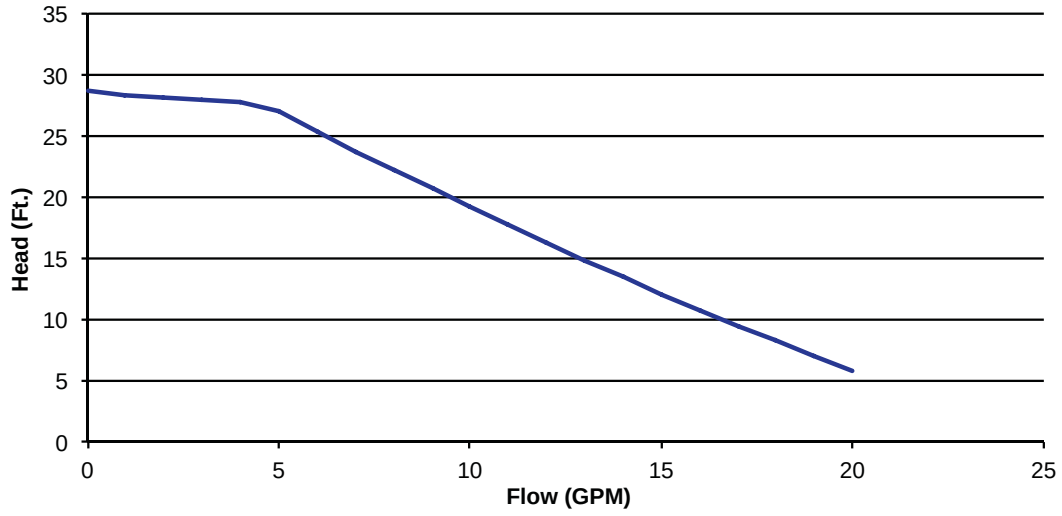
vFlow™ - Modulating Valve and Variable Pump Tables

Modulating Valve for Closed Loop Applications/Water Pressure Drop Adder

Model	CV	WPD Adders		
		GPM	PSI	FT
09	4.9	1.5	0.09	0.22
		2.3	0.21	0.49
		3.0	0.37	0.87
12		1.8	0.13	0.29
		2.6	0.28	0.65
		3.5	0.51	1.18
15	10.3	2.3	0.05	0.11
		3.4	0.11	0.25
		4.5	0.19	0.44
18		3.4	0.11	0.25
		5.1	0.25	0.57
		6.8	0.44	1.01
24		4.0	0.15	0.35
		6.0	0.34	0.78
		8.0	0.6	1.39
30		4.0	0.15	0.35
		6.0	0.34	0.78
		8.0	0.6	1.39
36		4.5	0.19	0.44
		6.8	0.43	0.99
		9.0	0.76	1.76

UPM Geo 25-85 Standard Head Variable Pump Performance



GPM	Head (ft)
0.00	28.7
1.00	28.4
2.00	28.1
3.00	27.9
4.00	27.7
5.00	27.0
6.00	25.3
7.00	23.7
8.00	22.2
9.00	20.6
10.00	19.1
11.00	17.7
12.00	16.2
13.00	14.8
14.00	13.4
15.00	12.1
16.00	10.8
17.00	9.5
18.00	8.2
19.00	7.0
20.00	5.8

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PSC Blower Performance Data

TSM with PSC Motor

Airflow in CFM with wet coil and clean 1" (25mm) fiberglass air filter.

Size	Fan Speed	Rated CFM	Min CFM	External Static Pressure (in. wg)										
				0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50
09	High	400H/350C	284	425	415	400	380	360	330	320				
	Medium			360	345	325	320	300						
	Low			300										
12	High	500H/400C	310	520	490	460	440	420	400	375	330			
	Medium			345	330	325	320	310						
	Low			330	320	310	Operation not recommended							
15	High	600	416	689	672	664	652	642	633	618	605	590	568	539
	Medium			600	576	564	554	544	534	525	509	493	447	427
	Low			519	505	487	475	449	437	423				
18	High	685	480	685	674	664	653	640	627	612	594	575	553	528
	Medium			591	581	572	562	552	541	529	515	498	479	
	Low			514	503	492	482							
24	High	850	596	850	830	808	783	785	730	703	672	641	611	
	Medium			761	727	707	679	655	628	602				
	Low			653	630	610	594							
30	High	1000	798	1346	1310	1284	1221	1172	1135	1108	1069	1036	996	959
	Medium			1140	1113	1101	1077	1056	1030	1010	979	952	917	886
	Low			1008	980	968	949	934	914	897	870	846	810	
36	High	1200	882	1262	1234	1209	1180	1153	1122	1091	1057	1024	989	954
	Medium			1129	1107	1090	1068	1046	1020	996	965	935	901	
	Low			1010	995	980	962	940	938	916	893			

Units with CXM or DXM2 factory shipped on medium and HIGH TAPs. Field select other TAPs if needed.
All airflow is rated at lowest Voltage if unit is dual Voltage rated, i.e. 208V for 208-230V units.
All units AHRI/ISO/ASHRAE 13256-1 rated at CFM in table.
Airflow tolerance 7% with recommended supply air openings and sizes. (See SA Grille Table)

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ECM Blower Performance Data

TSM Non Ducted ECM 88 and 80" Cabinets

All data wet coil clean filter.

Tranquility Model	ESP Range (in wg)	Range	Cooling Mode		Dehumid Mode		Heating Mode		Constant Fan Only Mode	Hi Fan Mode	Aux Emerg Mode
			Stg 2	Stg 1	Stg 2	Stg 1	Stg 2	Stg 1			
TSM09	0 to 0.25	Default	400	350	350	300	450	400	300	400	450
		Maximum	500	500	500	500	500	500	500	500	500
		Minimum	300	300	300	300	300	300	300	300	400
TSM12	0 to 0.25	Default	450	400	400	350	450	400	300	400	450
		Maximum	500	500	500	500	500	500	500	500	500
		Minimum	300	300	300	300	300	300	300	300	400
TSM15	0 to 0.3	Default	700	600	600	500	600	500	500	600	600
		Maximum	700	700	700	700	700	700	700	700	700
		Minimum	500	500	500	500	500	500	500	500	500
TSM18	0 to 0.3	Default	700	600	600	500	700	600	500	600	600
		Maximum	800	800	800	800	800	800	800	800	800
		Minimum	500	500	500	500	500	500	500	500	500
TSM24	0 to 0.3	Default	850	750	750	650	750	650	600	750	750
		Maximum	950	950	950	950	950	950	950	950	950
		Minimum	650	650	600	600	600	600	600	600	600
TSM30	0 to 0.4	Default	1100	1000	1000	900	1100	1000	700	850	1000
		Maximum	1100	1000	1100	900	1100	1100	1100	1100	1100
		Minimum	900	850	800	800	900	900	700	700	900
TSM36	0 to 0.4	Default	1200	1100	1100	1000	1200	1100	900	950	1350
		Maximum	1350	1350	1350	1350	1350	1350	1350	1350	1350
		Minimum	1100	1100	1100	1000	900	900	900	900	1000

All units AHRI/ISO/ASHRAE 13256-1 rated on CFM shown on performance data page.
Airflow is rated at lowest Voltage if unit is dual Voltage rated, i.e. 208V for 208-230V units.
Shipped on default settings. C = Cooling; H = Heating; D = Dehumidification.
Change from default setting with service tool (ACDU02) or Communicating thermostat (ATC32U01).
Airflow is controlled within 7% up to the max ESP with recommended supply air openings and sizes (See SA Grille Table).
TRM15-36 ramp default is 30.

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Sound Data

Model	Mode	Free Standing Ductless Standard Construction							Free Standing Ductless UltraQuiet Construction						
		Octive Band Frequency, Hz							Octive Band Frequency, Hz						
		125	250	500	1000	2000	4000	8000	125	250	500	1000	2000	4000	8000
TSM09	Fan Only Low Speed Fan	53	45	46	37	30	30	34	53	45	46	37	30	30	34
	Fan Only Med Speed Fan	55	49	49	41	35	34	35	55	49	49	41	35	34	35
	Fan Only High Speed Fan	57	52	52	45	40	38	38	57	52	52	45	40	38	38
	Cooling Low Speed Fan	55	48	46	38	31	30	34	53	46	44	37	31	30	34
	Cooling Med Speed Fan	57	50	48	42	35	33	35	55	48	46	41	35	33	35
	Cooling High Speed Fan	58	53	51	45	40	38	37	56	51	49	44	40	38	37
	Heating Low Speed Fan	57	49	47	40	34	31	34	55	47	45	39	34	31	34
	Heating Med Speed Fan	59	51	50	43	38	34	34	57	49	48	42	38	34	34
	Heating High Speed Fan	59	53	52	46	41	38	37	57	51	50	45	41	38	37
TSM12	Fan Only Low Speed Fan	53	45	46	37	31	30	34	53	45	46	37	31	30	34
	Fan Only Med Speed Fan	55	49	49	42	36	34	35	55	49	49	42	36	34	35
	Fan Only High Speed Fan	57	52	52	45	40	38	37	57	52	52	45	40	38	37
	Cooling Low Speed Fan	56	45	45	38	29	30	34	54	43	43	37	29	30	34
	Cooling Med Speed Fan	57	49	48	41	35	33	35	55	47	46	40	35	33	35
	Cooling High Speed Fan	58	51	51	45	40	37	37	56	49	49	44	40	37	37
	Heating Low Speed Fan	60	48	48	42	33	31	34	58	46	46	41	33	31	34
	Heating Med Speed Fan	59	50	50	44	37	33	34	57	48	48	43	37	33	34
	Heating High Speed Fan	59	52	52	46	40	37	36	57	50	50	45	40	37	36
TSM15	Fan Only Low Speed Fan	60	57	55	48	45	46	40	60	57	55	48	45	46	40
	Fan Only Med Speed Fan	61	58	57	50	47	48	42	61	58	57	50	47	48	42
	Fan Only High Speed Fan	63	60	58	52	49	49	44	63	60	58	52	49	49	44
	Cooling Low Speed Fan	60	57	55	49	45	46	40	58	55	53	48	45	46	40
	Cooling Med Speed Fan	62	59	57	50	46	47	42	60	57	55	49	46	47	42
	Cooling High Speed Fan	62	60	58	52	48	49	44	60	58	56	51	48	49	44
	Heating Low Speed Fan	61	57	55	49	45	46	40	59	55	53	48	45	46	40
	Heating Med Speed Fan	62	58	57	50	46	47	42	60	56	55	49	46	47	42
	Heating High Speed Fan	62	59	58	51	48	49	43	60	57	56	50	48	49	43
TSM18	Fan Only Low Speed Fan	60	57	55	48	45	46	40	60	57	55	48	45	46	40
	Fan Only Med Speed Fan	61	58	57	50	47	47	42	61	58	57	50	47	47	42
	Fan Only High Speed Fan	63	60	58	52	49	49	44	63	60	58	52	49	49	44
	Cooling Low Speed Fan	60	57	55	48	45	46	40	58	55	53	47	45	46	40
	Cooling Med Speed Fan	61	59	57	50	47	47	42	59	57	55	49	47	47	42
	Cooling High Speed Fan	63	60	58	51	48	49	44	61	58	56	50	48	49	44
	Heating Low Speed Fan	63	59	56	50	45	45	40	61	57	54	49	45	45	40
	Heating Med Speed Fan	63	59	57	51	46	47	41	61	57	55	50	46	47	41
	Heating High Speed Fan	64	60	58	52	48	49	43	62	58	56	51	48	49	43
TSM24	Fan Only Low Speed Fan	53	50	46	41	36	33	34	53	50	46	41	36	33	34
	Fan Only Med Speed Fan	56	54	50	46	43	39	35	56	54	50	46	43	39	35
	Fan Only High Speed Fan	62	59	56	52	50	47	41	62	59	56	52	50	47	41
	Cooling Low Speed Fan	54	51	49	44	37	33	34	52	49	47	43	37	33	34
	Cooling Med Speed Fan	57	54	51	47	41	38	35	55	52	49	46	41	38	35
	Cooling High Speed Fan	62	59	55	52	48	45	39	60	57	53	51	48	45	39
	Heating Low Speed Fan	70	53	50	47	42	38	36	68	51	48	46	42	38	36
	Heating Med Speed Fan	69	55	52	48	44	41	37	67	53	50	47	44	41	37
	Heating High Speed Fan	69	60	56	53	51	48	45	67	58	54	52	51	48	45
TSM30	Fan Only Low Speed Fan	64	61	57	54	52	49	47	64	61	57	54	52	49	47
	Fan Only Med Speed Fan	68	65	60	57	56	53	48	68	65	60	57	56	53	48
	Fan Only High Speed Fan	74	71	63	59	55	55	50	74	71	63	59	55	55	50
	Cooling Low Speed Fan	65	62	55	51	46	45	39	63	60	53	50	46	45	39
	Cooling Med Speed Fan	69	65	57	53	49	49	43	67	63	55	52	49	49	43
	Cooling High Speed Fan	74	71	63	59	55	55	50	72	69	61	58	55	55	50
	Heating Low Speed Fan	70	62	56	51	46	46	40	68	60	55	50	46	46	40
	Heating Med Speed Fan	71	65	58	53	49	49	44	69	63	56	52	49	49	44
	Heating High Speed Fan	75	71	63	58	55	55	50	73	69	61	57	55	55	50
TSM36	Fan Only Low Speed Fan	64	61	57	54	52	49	47	64	61	57	54	52	49	47
	Fan Only Med Speed Fan	68	65	60	57	56	53	48	68	65	60	57	56	53	48
	Fan Only High Speed Fan	74	71	66	63	62	60	57	74	71	66	63	62	60	57
	Cooling Low Speed Fan	64	61	57	53	51	48	45	62	59	55	52	51	48	45
	Cooling Med Speed Fan	68	64	60	57	54	52	46	66	62	58	56	54	52	46
	Cooling High Speed Fan	73	71	64	61	59	58	54	71	69	62	60	59	58	54
	Heating Low Speed Fan	68	62	57	53	51	49	44	66	60	55	52	51	49	44
	Heating Med Speed Fan	70	64	60	56	55	53	48	68	62	58	55	55	53	48
	Heating High Speed Fan	74	71	64	61	60	59	54	72	69	62	60	60	59	54

Notes:

1. Sound power data is obtained using appropriate testing method in a qualified reverberant sound laboratory as per AHRI 350-2008.
2. Cabinet configuration 09 and 12 have 1-12x12 SA grill; 15 and 18 have 2-12x12 SA grilles; 24-36 have 2-16x16 SA grilles. Data will vary for other configurations.
3. For d'BA and NC in particular room use sound analyzer on climatemaster.com

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Physical Data

Model	09	12	15	18	24	30	36
Compressor (1 Each)	Rotary				Scroll		
Factory Charge HFC-410A (oz) [kg]	34 [.07]	34 [.97]	43 [1.22]	53 [1.51]	71 [2.01]	66 [1.87]	81 [2.29]
PSC & Blower Wheel							
Blower Wheel Size (dia x w) - (in) [mm]	6.75 x 7.25 [174 x 184]	6.75 x 7.25 [174 x 184]	9.50 x 7.12 [241 x 181]	9.50 x 7.12 [241 x 181]	9.50 x 7.12 [241 x 181]	9.50 x 8.06 [241 x 205]	9.50 x 8.06 [241 x 205]
ECM Motor & Blower							
Motor (hp) [W]	1/8 [93]	1/8 [93]	1/3 [248]	1/3 [248]	1/3 [248]		1/2 [373]
Blower Wheel Size (dia x w) - (in) [mm]	6.75 x 7.25 [174 x 184]	6.75 x 7.25 [174 x 184]	9.50 x 7.12 [241 x 181]	9.50 x 7.12 [241 x 181]	9.50 x 8.06 [241 x 205]		
Chassis Air Coil							
Air Coil Dimensions (h x w) - (in) [mm]	28 x 14 [711 x 356]	28 x 14 [711 x 356]	28 x 14 [711 x 356]	28 x 14 - [711 x 356]	30 x 18 [762 x 457]	30 x 18 [762 x 457]	30 x 18 [762 x 457]
Standard Filter - 1" [25.4 mm], (w x h) - (in) [mm]	16 x 30 [406 x 762]	16 x 30 [406 x 762]	16 x 30 [406 x 762]	16 x 30 [406 x 762]	20 x 32 [508 x 813]	20 x 32 [508 x 813]	20 x 32 [508 x 813]
Coax Volume (Gallons)	0.215	0.26	0.367	0.367	0.602	0.602	0.602
Hose Size (in)	1/2	1/2	3/4	3/4	1		
Weight							
Chassis - (lbs) [kg]	103 [47]	105 [48]	123 [56]	125 [57]	186 [84]	190 [86]	192 [87]
Cabinet - (lbs) [kg]	189 [86]	189 [86]	189 [86]	189 [86]	243 [110]	243 [110]	243 [110]

Unit Maximum Water Working Pressure	
Options	**Max Pressure PSIG [kPa]**
Base Unit (Hoses)	400 [2757]
Internal Secondary Pump (ISP)	145 [999]
Internal Variable Pump	145 [999]
Internal Motorized Water Valve 2-Way (WMV)	300 [2,068]
Internal Modulating Water Valve	300 [2,068]
Internal Auto Flow Valve	400 [2,757]

Use the lowest maximum pressure rating when multiple options are combined.
* Units with MWV have 300 [2068] High Pressure Water Switch – 250 [1723] Auto Reset

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Electrical Data - PSC Motor

Model #		Rated Voltage	Min/Max Voltage	Compressor		Fan Motor FLA	Standard Unit					With Pump				
				RLA	LRA		Total FLA	MCA	SCCR kA rms symetrical	SCCR Volts Maximum	Max Fuse Amps	Total FLA	MCA	SCCR kA rms symetrical	SCCR Volts Maximum	Max Fuse / HACR
TSM09G	none	208-230/60/1	197/254	3.7	22.0	0.4	4.1	5.0	NA	NA	15	4.6	5.5	NA	NA	15
	2.5	208-230/60/1	197/254	3.7	22.0	0.4	16.1	20.0	NA	NA	20	16.6	20.5	NA	NA	20
TSM12G	none	208-230/60/1	197/254	4.7	25.0	0.7	5.4	6.6	NA	NA	15	5.9	7.1	NA	NA	15
	2.5	208-230/60/1	197/254	4.7	25.0	0.7	17.4	21.6	NA	NA	25	18.2	22.4	NA	NA	25
TSM15G	none	208-230/60/1	197/254	5.6	29.0	1.0	6.6	8.0	NA	NA	15	7.4	8.8	NA	NA	15
	2.5	208-230/60/1	197/254	5.6	29.0	1.0	18.6	23.0	NA	NA	25	19.4	23.8	NA	NA	25
	5	208-230/60/1	197/254	5.6	29.0	1.0	30.6	38.0	NA	NA	40	31.4	38.8	NA	NA	40
TSM18G	none	208-230/60/1	197/254	6.6	33.0	1.1	7.7	9.4	NA	NA	15	8.5	10.2	NA	NA	15
	2.5	208-230/60/1	197/254	6.6	33.0	1.1	19.6	24.3	NA	NA	25	20.4	25.1	NA	NA	30
	5	208-230/60/1	197/254	6.6	33.0	1.1	31.6	39.3	NA	NA	40	32.4	40.1	NA	NA	45
TSM24G	none	208-230/60/1	197/254	12.8	58.3	1.1	13.9	17.1	NA	NA	25	14.7	17.9	NA	NA	30
	2.5	208-230/60/1	197/254	12.8	58.3	1.1	25.9	32.1	NA	NA	40	26.7	32.9	NA	NA	40
	5	208-230/60/1	197/254	12.8	58.3	1.1	37.9	47.1	NA	NA	50	38.7	47.9	NA	NA	50
TSM30G	none	208-230/60/1	197/254	12.8	64.0	1.9	14.7	17.9	NA	NA	25	15.5	18.7	NA	NA	30
	2.5	208-230/60/1	197/254	12.8	64.0	1.9	27.4	33.6	NA	NA	40	28.2	34.4	NA	NA	40
	5	208-230/60/1	197/254	12.8	64.0	1.9	39.4	48.6	NA	NA	55	40.2	49.4	NA	NA	55
TSM36G	none	208-230/60/1	197/254	14.1	77.0	1.9	16.0	19.5	NA	NA	30	16.8	20.3	NA	NA	30
	2.5	208-230/60/1	197/254	14.1	77.0	1.9	28.7	35.2	NA	NA	45	29.5	36.0	NA	NA	45
	5	208-230/60/1	197/254	14.1	77.0	1.9	40.7	50.2	NA	NA	55	41.5	51.0	NA	NA	55
TSM09E	none	265/60/1	239/292	3.5	24.0	0.3	3.8	4.7	NA	NA	15	4.3	5.1	NA	NA	15
	2.5	265/60/1	239/292	3.5	24.0	0.3	12.8	15.9	NA	NA	20	13.3	16.4	NA	NA	20
TSM12E	none	265/60/1	239/292	4.2	22.0	2.0	6.2	7.3	NA	NA	15	5.3	6.4	NA	NA	15
	2.5	265/60/1	239/292	4.2	22.0	2.0	13.9	17.2	NA	NA	20	14.7	18.0	NA	NA	20
TSM15E	none	265/60/1	239/292	5.0	28.0	0.86	5.9	7.1	NA	NA	15	6.7	8.0	NA	NA	15
	2.5	265/60/1	239/292	5.0	28.0	0.86	14.9	18.4	NA	NA	20	15.7	19.2	NA	NA	20
	5	265/60/1	239/292	5.0	28.0	0.86	23.9	29.7	NA	NA	30	24.7	30.5	NA	NA	35
TSM18E	none	265/60/1	239/292	5.6	28.0	0.86	6.5	7.9	NA	NA	15	7.3	8.7	NA	NA	15
	2.5	265/60/1	239/292	5.6	28.0	0.86	16.5	20.4	NA	NA	25	17.3	21.2	NA	NA	25
	5	265/60/1	239/292	5.6	28.0	0.86	25.5	31.7	NA	NA	35	26.3	32.5	NA	NA	35
TSM24E	none	265/60/1	239/292	9.6	54.0	0.9	10.5	12.9	NA	NA	20	11.3	13.7	NA	NA	20
	2.5	265/60/1	239/292	9.6	54.0	0.9	19.5	24.2	NA	NA	30	20.3	25.0	NA	NA	30
	5	265/60/1	239/292	9.6	54.0	0.9	28.5	35.4	NA	NA	40	29.3	36.2	NA	NA	40
TSM30E	none	265/60/1	239/292	10.9	60.0	2.0	12.9	15.6	NA	NA	25	13.7	16.4	NA	NA	25
	2.5	265/60/1	239/292	10.9	60.0	2.0	21.9	26.9	NA	NA	35	22.7	27.7	NA	NA	35
	5	265/60/1	239/292	10.9	60.0	2.0	30.9	38.1	NA	NA	40	31.7	38.9	NA	NA	45
TSM36E	none	265/60/1	239/292	12.2	72.0	2.1	14.3	17.4	NA	NA	25	15.5	18.6	NA	NA	30
	2.5	265/60/1	239/292	12.2	72.0	2.1	23.2	28.5	NA	NA	35	24.0	29.3	NA	NA	35
	5	265/60/1	239/292	12.2	72.0	2.1	32.2	39.8	NA	NA	45	33.0	40.6	NA	NA	45

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Electrical Data - ECM Motor

Model with ECM Motor		Rated Voltage	Min/Max Voltage	Compressor		Motor FLA	standard unit					with pump				
				RLA	LRA		Total FLA	MCA	SCCR kA rms symetrical	SCCR Volts Maximum	Max Fuse / HACR	Total FLA	MCA	SCCR kA rms symetrical	SCCR Volts Maximum	Max Fuse / HACR
TSM09G	none	208-230/60/1	197/254	3.7	22.0	2.2	5.9	6.8	NA	NA	15	6.4	7.3	NA	NA	15
	2.5	208-230/60/1	197/254	3.7	22.0	2.2	17.9	21.8	NA	NA	25	18.4	22.3	NA	NA	25
TSM12G	none	208-230/60/1	197/254	4.7	25.0	2.2	6.9	8.1	NA	NA	15	7.4	8.6	NA	NA	15
	2.5	208-230/60/1	197/254	4.7	25.0	2.2	18.9	23.1	NA	NA	25	19.7	23.9	NA	NA	25
TSM15G	none	208-230/60/1	197/254	5.6	29.0	2.6	8.2	9.6	NA	NA	15	9.0	10.4	NA	NA	15
	2.5	208-230/60/1	197/254	5.6	29.0	2.6	20.2	24.6	NA	NA	25	21.0	25.4	NA	NA	30
	5	208-230/60/1	197/254	5.6	29.0	2.6	32.2	39.6	NA	NA	40	33.0	40.0	NA	NA	40
TSM18G	none	208-230/60/1	197/254	6.6	33.0	2.6	9.2	10.9	NA	NA	15	10.0	11.7	NA	NA	15
	2.5	208-230/60/1	197/254	6.6	33.0	2.6	21.2	25.9	NA	NA	30	22.0	26.7	NA	NA	30
	5	208-230/60/1	197/254	6.6	33.0	2.6	33.2	40.9	NA	NA	45	34.0	41.7	NA	NA	45
TSM24G	none	208-230/60/1	197/254	12.8	58.3	2.6	15.4	18.6	NA	NA	30	16.2	19.4	NA	NA	30
	2.5	208-230/60/1	197/254	12.8	58.3	2.6	27.4	33.6	NA	NA	40	28.2	34.4	NA	NA	40
	5	208-230/60/1	197/254	12.8	58.3	2.6	39.4	48.6	NA	NA	50	40.2	49.4	NA	NA	50
TSM30G	none	208-230/60/1	197/254	12.8	64.0	2.6	15.4	18.6	NA	NA	30	16.2	19.4	NA	NA	30
	2.5	208-230/60/1	197/254	12.8	64.0	2.6	27.4	33.6	NA	NA	40	28.2	34.4	NA	NA	40
	5	208-230/60/1	197/254	12.8	64.0	2.6	39.4	48.6	NA	NA	50	40.2	49.4	NA	NA	55
TSM36G	none	208-230/60/1	197/254	14.1	77.0	3.9	18.0	21.5	NA	NA	35	18.8	22.3	NA	NA	35
	2.5	208-230/60/1	197/254	14.1	77.0	3.9	30.0	36.5	NA	NA	40	30.8	37.3	NA	NA	45
	5	208-230/60/1	197/254	14.1	77.0	3.9	42.0	51.5	NA	NA	55	42.8	52.3	NA	NA	60
TSM09E	none	265/60/1	239/292	3.5	22.0	2.0	5.5	6.4	NA	NA	15	6.3	7.2	NA	NA	15
	2.5	265/60/1	239/292	3.5	22.0	2.0	14.5	17.6	NA	NA	20	15.0	18.1	NA	NA	20
TSM12E	none	265/60/1	239/292	4.2	22.0	2.0	6.2	7.3	NA	NA	15	7.0	8.1	NA	NA	15
	2.5	265/60/1	239/292	4.2	22.0	2.0	15.2	18.5	NA	NA	20	16.0	19.3	NA	NA	20
TSM15E	none	265/60/1	239/292	5.0	28.0	2.1	7.1	8.4	NA	NA	15	7.9	9.2	NA	NA	15
	2.5	265/60/1	239/292	5.0	28.0	2.1	16.1	19.6	NA	NA	20	16.9	20.4	NA	NA	25
	5	265/60/1	239/292	5.0	28.0	2.1	25.1	30.8	NA	NA	35	25.9	31.7	NA	NA	35
TSM18E	none	265/60/1	239/292	5.6	28.0	2.1	7.7	9.1	NA	NA	15	8.5	9.9	NA	NA	15
	2.5	265/60/1	239/292	5.6	28.0	2.1	17.7	21.6	NA	NA	25	18.5	22.4	NA	NA	25
	5	265/60/1	239/292	5.6	28.0	2.1	26.7	32.9	NA	NA	35	27.5	33.7	NA	NA	35
TSM24E	none	265/60/1	239/292	9.6	54.0	2.1	11.7	14.1	NA	NA	20	12.5	14.9	NA	NA	20
	2.5	265/60/1	239/292	9.6	54.0	2.1	20.7	25.4	NA	NA	30	21.5	26.2	NA	NA	30
	5	265/60/1	239/292	9.6	54.0	2.1	29.7	36.6	NA	NA	40	30.5	37.4	NA	NA	40
TSM30E	none	265/60/1	239/292	10.9	60.0	2.1	13.0	15.7	NA	NA	25	13.8	16.5	NA	NA	25
	2.5	265/60/1	239/292	10.9	60.0	2.1	22.0	27.0	NA	NA	35	22.8	27.8	NA	NA	35
	5	265/60/1	239/292	10.9	60.0	2.1	31.0	38.2	NA	NA	40	31.8	39.0	NA	NA	40
TSM36E	none	265/60/1	239/292	12.2	72.0	3.2	15.4	18.5	NA	NA	25	16.2	19.3	NA	NA	30
	2.5	265/60/1	239/292	12.2	72.0	3.2	24.4	29.7	NA	NA	35	25.2	30.5	NA	NA	40
	5	265/60/1	239/292	12.2	72.0	3.2	33.4	41.0	NA	NA	45	34.2	41.8	NA	NA	45

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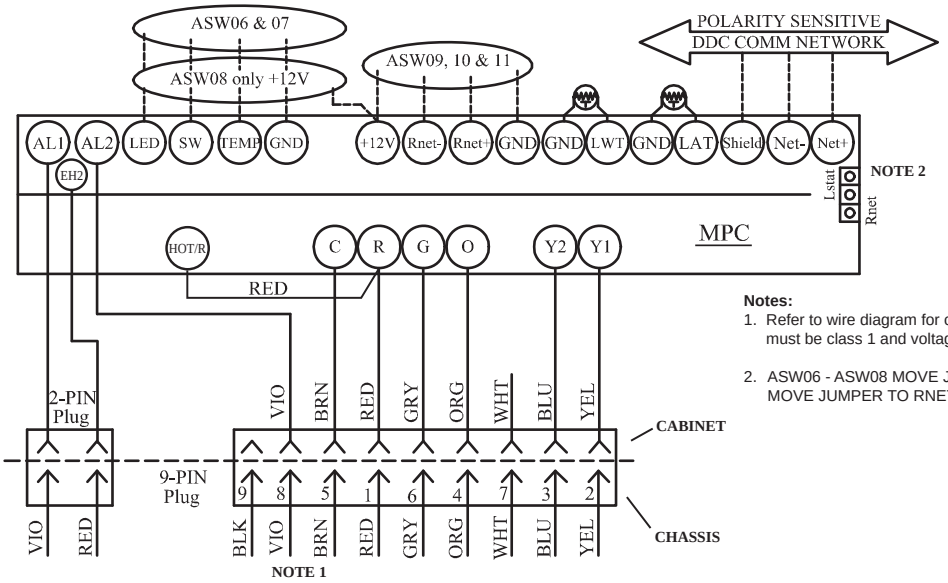
TSM Series Wiring Diagram Matrix

All current diagrams can be located online at climatemaster.com. Click 'Commercial' (go to 'Quick Links' in the upper right) using the part numbers presented below.

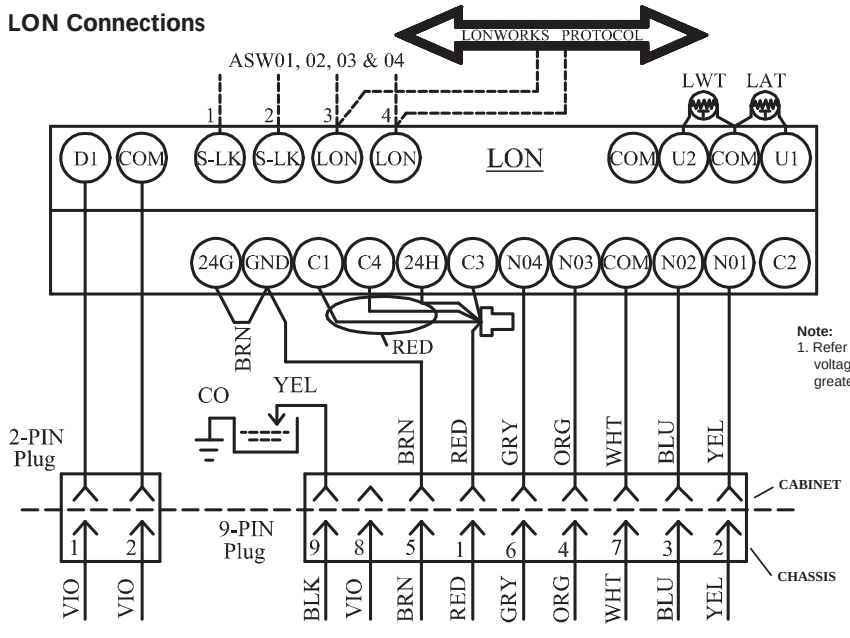
Model	Refrigerant	Wiring Diagram Part Number	Electrical	Control		Agency
TSM09-36 PSC	EarthPure® (HFC-410A)	96B0173N33	208-230/60/1, 265/60/1	CXM	ACO/MCO	ETL
		96B0173N32		DXM2		
TSM09-12 ECM Motor		96B0173N34		DXM2		
TSM 15-36 ECM Motor		96B0173N35				
TSM09-36 PSC with Modulating Pump		96B0173N51				
		96B0173N52				
TSM09-12 ECM with Modulating Pump		96B0173N53		DXM2		
		96B0173N54				
TSM15-36 ECM with Modulating Pump		96B0173N55				
		96B0173N56				

MPC Connections



Notes:
1. Refer to wire diagram for connection to CXM/DXM2. Low voltage wiring must be class 1 and voltage rated equal or greater than unit supply voltage.
2. ASW06 - ASW08 MOVE JUMPER TO LSTAT, ASW09 - ASW11 MOVE JUMPER TO RNET.

LON Connections



Note:
1. Refer to wire diagram for connection to CXM/DXM2. Low voltage wiring must be class 1 and voltage rated equal or greater than unit supply voltage.

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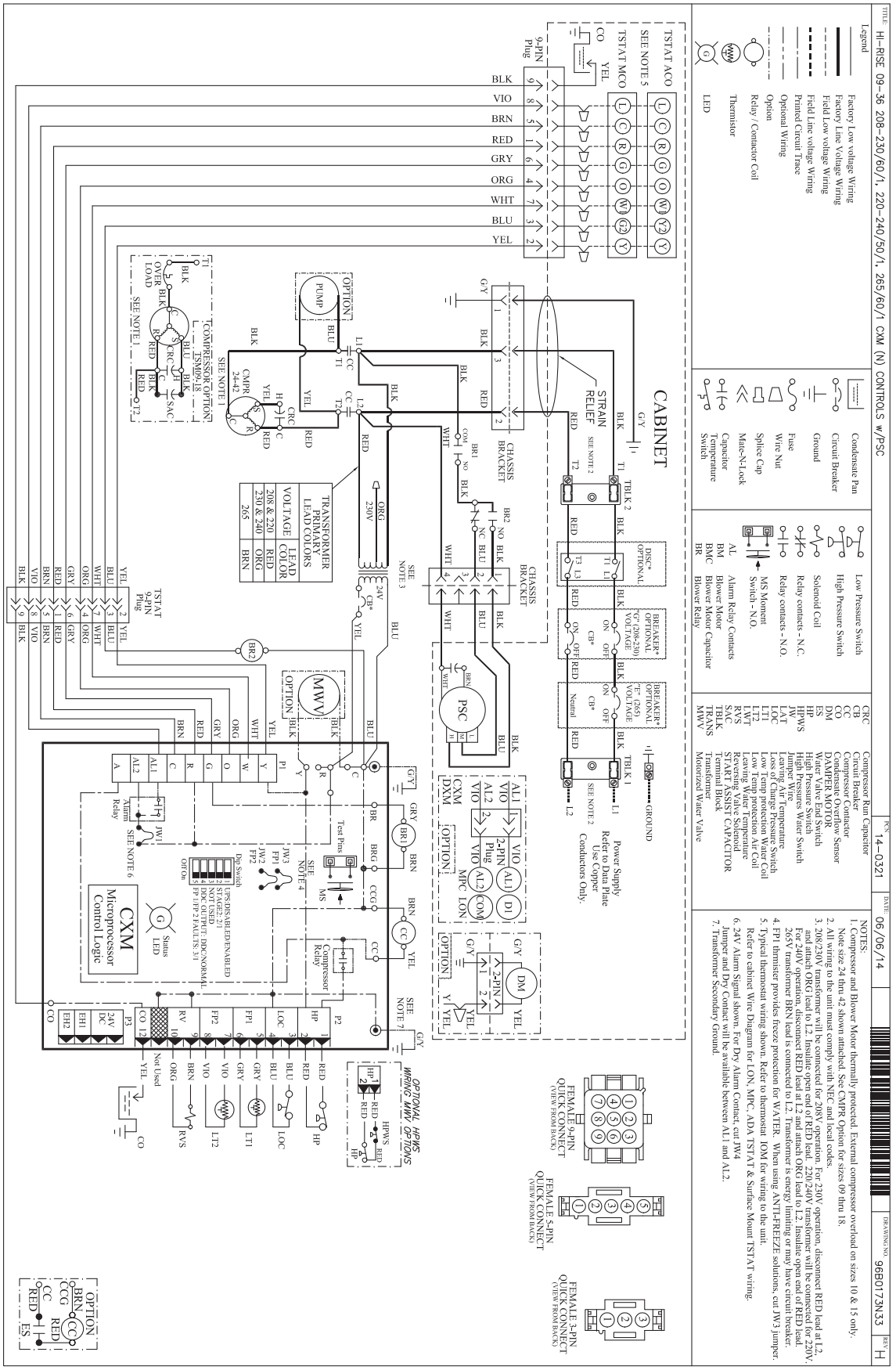
Typical Wiring Diagram – TSM09 - 36 CXM with PSC Motor


TITLE: HI-RISE 09-36 208-230/60/1, 220-240/50/1, 265/60/1 CXM (N) CONTROLS w/PSC
PCN: 14-0321
DATE: 06/06/14
DRAWING NO: 96B0173N33
REV: H
Legend
Factory Low voltage Wiring
Factory Line Voltage Wiring
Field Low voltage Wiring
Field Line voltage Wiring
Printed Circuit Trace
Optional Wiring
Option
Relay / Contactor Coil
Thermistor
LED
Condensate Pan
Circuit Breaker
Ground
Fuse
Wire Nut
Splice Cap
Mate-N-Lock
Capacitor
Temperature Switch
Low Pressure Switch
High Pressure Switch
Solenoid Coil
Relay contacts - N.C.
Relay contacts - N.O.
MS Momant Switch - N.O.
Alarm Relay Contacts
Blower Motor
Blower Motor Capacitor
Blower Relay
CRC Compressor Run Capacitor
CB Circuit Breaker
C Compressor Contactor
CO Condensate Overflow Sensor
DM DAMPER MOTOR
ES Water Coil Freeze Protection Switch
HP High Pressure Switch
HPWS High Pressures Water Switch
JW Jumper Wire
LAT Leaving Air Temperature
LOC Loss of Charge Pressure Switch
LTI Low Temperature Water Coil
LT2 Low Temp protection Air Coil
LWT Leaving Water Temperature
RVS Reversing Valve Solenoid
SAC START ASSIST CAPACITOR
TB Terminal Block
TRANS Transformer
MWV Motorized Water Valve
NOTES:
1. Compressor and Blower Motor thermally protected. External compressor overload on sizes 10 & 15 only. Note- size 24 thru 42 shown attached. See CMPR Option for sizes 09 thru 18.
2. All wiring to the unit must comply with NEC and local codes.
3. 208/230V transformer will be connected for 208V operation. For 230V operation, disconnect RED lead at L2, and attach ORG lead to L2. Insulate open end of RED lead. 220/240V transformer will be connected for 220V. For 240V operation, disconnect RED lead at L2 and attach ORG lead to L2. Insulate open end of RED lead. 265V transformer BRN lead is connected to L2. Transformer is energy limiting or may have circuit breaker.
4. FP1 thrmister provides freeze protection for WATER. When using ANTI-FREEZE solutions, cut JW3 jumper.
5. Typical thermostat wiring shown. Refer to thermostat IOM for wiring to the unit.
6. 24V Alarm Signal shown. For Dry Alarm Contact, cut JW4 Jumper and Dry Contact will be available between AL1 and AL2.
7. Transformer Secondary Ground.
Power Supply
Refer to Data Plate
Use Copper
Conductors Only.
TRANSFORMER PRIMARY LEAD COLORS
VOLTAGE / LEAD COLOR
208 & 220 RED
230 & 240 ORG
265 BRN
COMPRESSOR OPTION TSM09-18
CABINET
STRAIN RELIEF
CHASSIS BRACKET
DISC* OPTIONAL
BREAKER* OPTIONAL "G" (208-230) VOLTAGE
BREAKER* OPTIONAL "E" (265) VOLTAGE
PUMP OPTION
PSC
CXM Microprocessor Control Logic
Status LED
Compressor Relay
Alarm Relay
Test Pins
Dip Switch
UPS (DIS=LED ENABLED)
STAGE2: 2/1
NOT USED
FLOW: FP1=NORMAL FP2=FAULTS: 2/1
OPTIONAL HPWS WIRING MWV OPTIONS
9-PIN Plug
TSTAT ACO
TSTAT MCO
CO
SEE NOTE 5
BLK VIO BRN RED GRY ORG WHT BLU YEL
24V DC
EH1 EH2
P1 P2 P3
HP FP2 FP1 LOC RVS LT1 LT2 Not Used
2-PIN Plug
MPC LON
DXM
CXM
OPTION
FEMALE 9-PIN QUICK CONNECT (VIEW FROM BACK)
FEMALE 5-PIN QUICK CONNECT (VIEW FROM BACK)
FEMALE 3-PIN QUICK CONNECT (VIEW FROM BACK)

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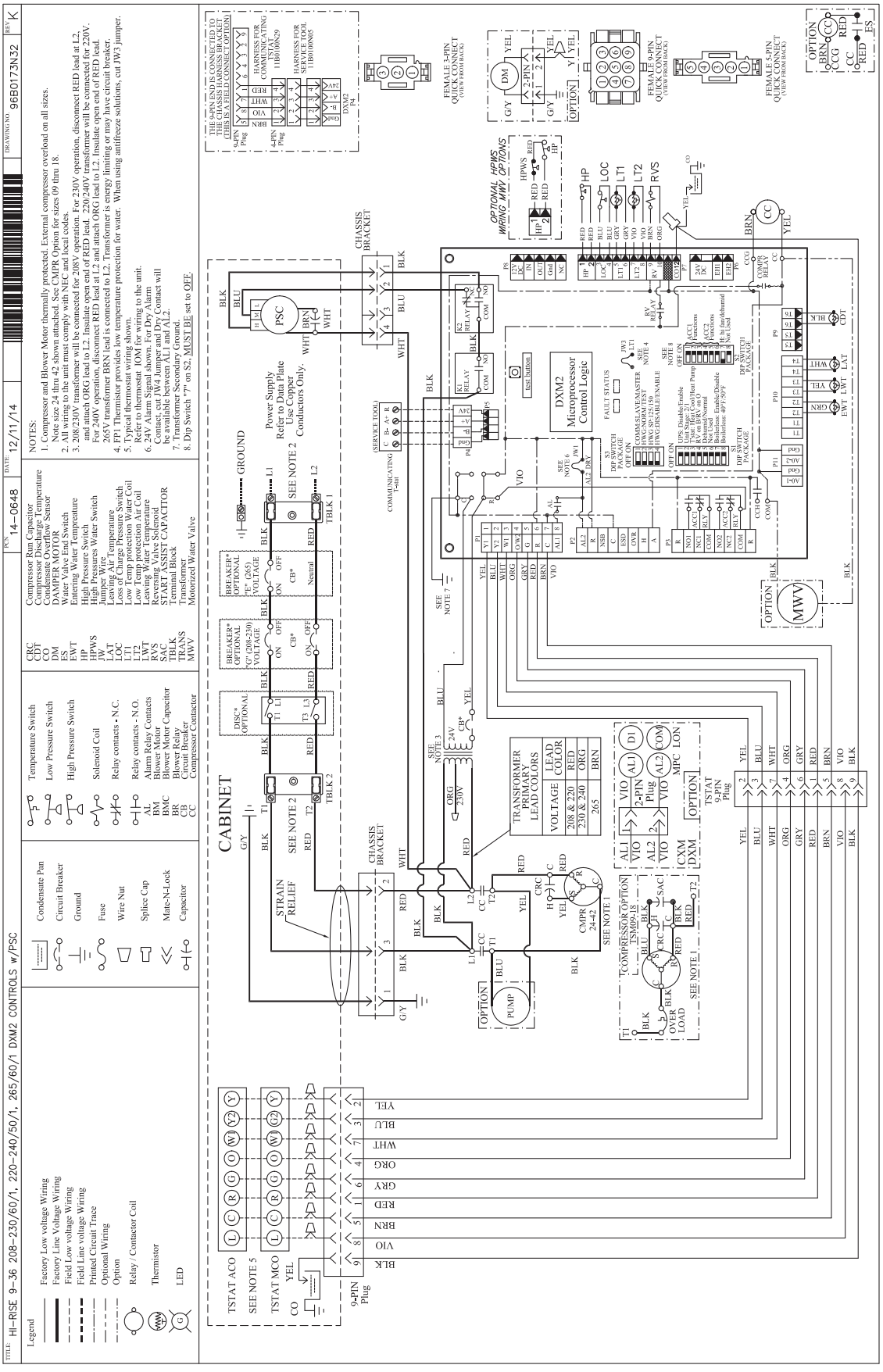
Typical Wiring Diagram – TSM09 - 36 DXM2 with PSC Motor


TITLE HI-RISE 9-36 208-230/60/1, 220-240/50/1, 265/60/1 DXM2 CONTROLS w/PSC
PCN 14-0648
DATE 12/11/14
DRAWING NO. 96B0173N32
REV K
Legend
Factory Low voltage Wiring
Factory Line Voltage Wiring
Field Low voltage Wiring
Field Line voltage Wiring
Printed Circuit Trace
Optional Wiring
Option
Relay / Contactor Coil
Thermistor
LED
Condensate Pan
Circuit Breaker
Ground
Fuse
Wire Nut
Splice Cap
Mate-N-Lock
Capacitor
Temperature Switch
Low Pressure Switch
High Pressure Switch
Solenoid Coil
Relay contacts - N.C.
Relay contacts - N.O.
Alarm Relay Contacts
Blower Motor
Blower Motor Capacitor
Blower Relay
Circuit Breaker
Compressor Contactor
CRC Compressor Run Capacitor
CDT Compressor Discharge Temperature
CO Condensate Overflow Sensor
DM DAMPER MOTOR
ES Water Valve End Switch
EWT Entering Water Tempreature
HP High Pressure Switch
HPWS High Pressures Water Switch
Jumper Wire
LAT Leaving Air Temperature
LOC Loss of Charge Pressure Switch
LT1 Low Temp protection Water Coil
LT2 Low Temp protection Air Coil
LWT Leaving Water Temperature
RVS Reversing Valve Solenoid
SAC START ASSIST CAPACITOR
TBLK Terminal Block
TRANS Transformer
MWV Motorized Water Valve
NOTES:
1. Compressor and Blower Motor thermally protected. External compressor overload on all sizes. Note size 24 thru 42 shown attached. See CMPR Option for sizes 09 thru 18.
2. All wiring to the unit must comply with NEC and local codes.
3. 208/230V transformer will be connected for 208V operation. For 230V operation, disconnect RED lead at L2, and attach ORG lead to L2. Insulate open end of RED lead. 220/240V transformer will be connected for 220V. For 240V operation, disconnect RED lead at L2 and attach ORG lead to L2. Insulate open end of RED lead. 265V transformer BRN lead is connected to L2. Transformer is energy limiting or may have circuit breaker.
4. FP1 Thermistor provides low temperature protection for water. When using antifreeze solutions, cut JW3 jumper.
5. Typical thermostat wiring shown. Refer to thermostat IOM for wiring to the unit.
6. 24V Alarm Signal shown. For Dry Alarm Contact, cut JW4 Jumper and Dry Contact will be across Terminal AL1 and AL2.
7. Transformer Secondary Ground.
8. Dip Switch "7" on S2, MUST BE set to OFF.
CABINET
STRAIN RELIEF
SEE NOTE 2
CHASSIS BRACKET
TRANSFORMER PRIMARY LEAD COLORS
VOLTAGE | LEAD COLOR
208 & 220 | RED
230 & 240 | ORG
265 | BRN
SEE NOTE 3
DISC* OPTIONAL
BREAKER* OPTIONAL "E" (265) VOLTAGE
BREAKER* OPTIONAL "G" (208-230) VOLTAGE
CB* Normal
GROUND
Power Supply Refer to Data Plate Use Copper Conductors Only
SEE NOTE 2
TBLK 1
TBLK 2
PSC
CMPR 24-42
SEE NOTE 1
PUMP
OPTION
TSTAT ACO
TSTAT MCO
SEE NOTE 5
9-PIN Plug
COMMUNICATING 2-wire
(SERVICE TOOL) C R E
DXM2 Microprocessor Control Logic
FAULT STATUS
DIP SWITCH PACKAGE OPTION
SEE NOTE 4
SEE NOTE 6
SEE NOTE 7
JW3 LT1
JW4 AL2
JW1
FP1
FP2
RVS RELAY
K1 RELAY
K2 RELAY
Test Button
OPTIONAL HPWS WIRING MWV OPTIONS
HPWS
HP
LOC
LT1
LT2
RVS
MWV
CC
CDT
EWT
LWT
LAT
TSTAT 9-PIN Plug
DXM
MPC
LON
2-PIN Plug
OVER LOAD
HARNESS FOR OPTIONAL MWV
HARNESS FOR SERVICE TOOL 11B01000M5
FEMALE 3-PIN QUICK CONNECT (VIEW FROM BACK)
FEMALE 4-PIN QUICK CONNECT (VIEW FROM BACK)
FEMALE 5-PIN QUICK CONNECT (VIEW FROM BACK)
THE 7 PIN TSTAT CONNECTS TO THE CHASSIS HARNESS BRACKET (THIS IS A FIELD CONNECT OPTION)
HARNESS FOR OPTIONAL MWV
TSTAT 11B01000N29

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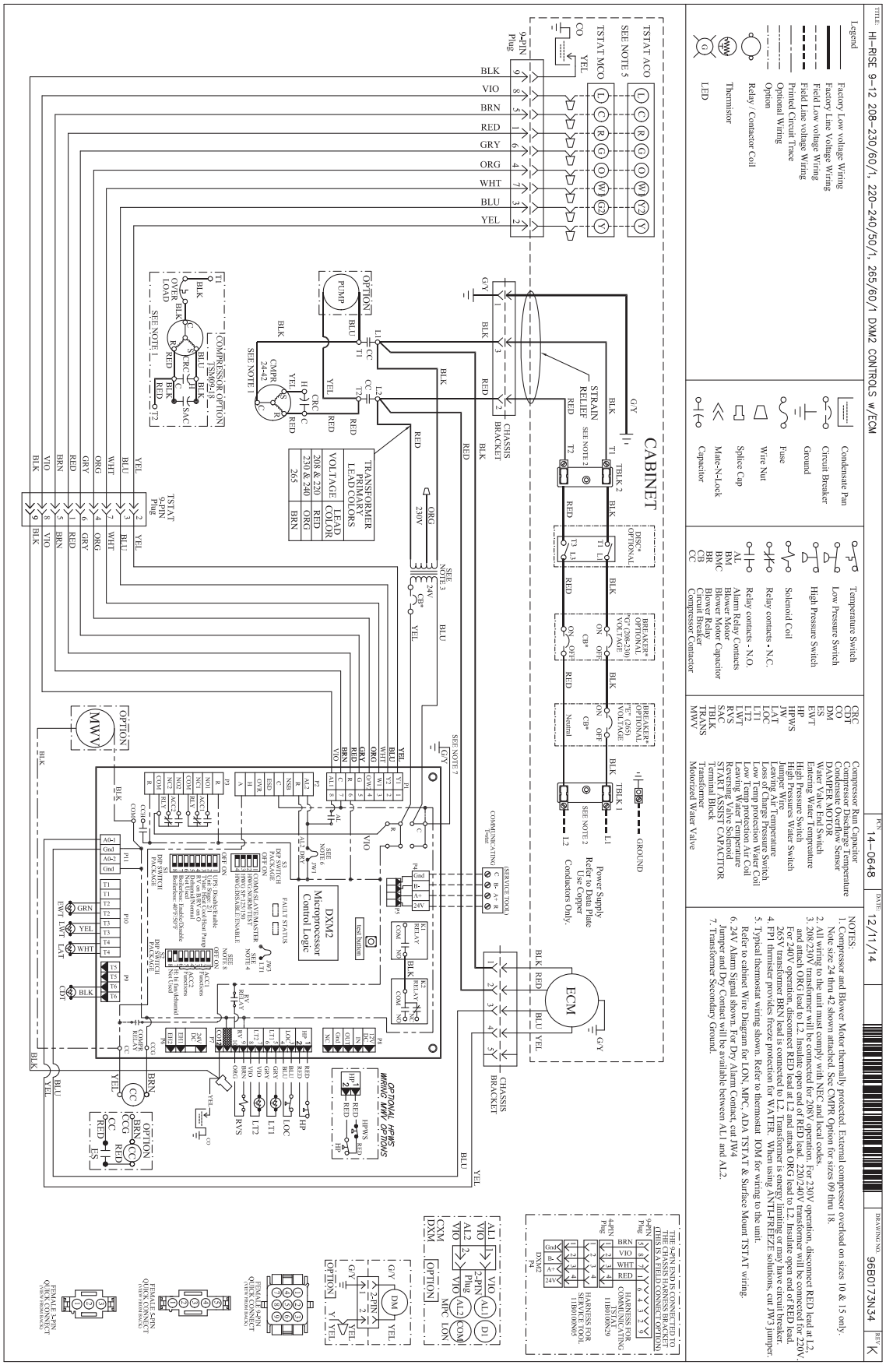
Typical Wiring Diagram – TSM09 - 12 DXM2 with ECM Motor



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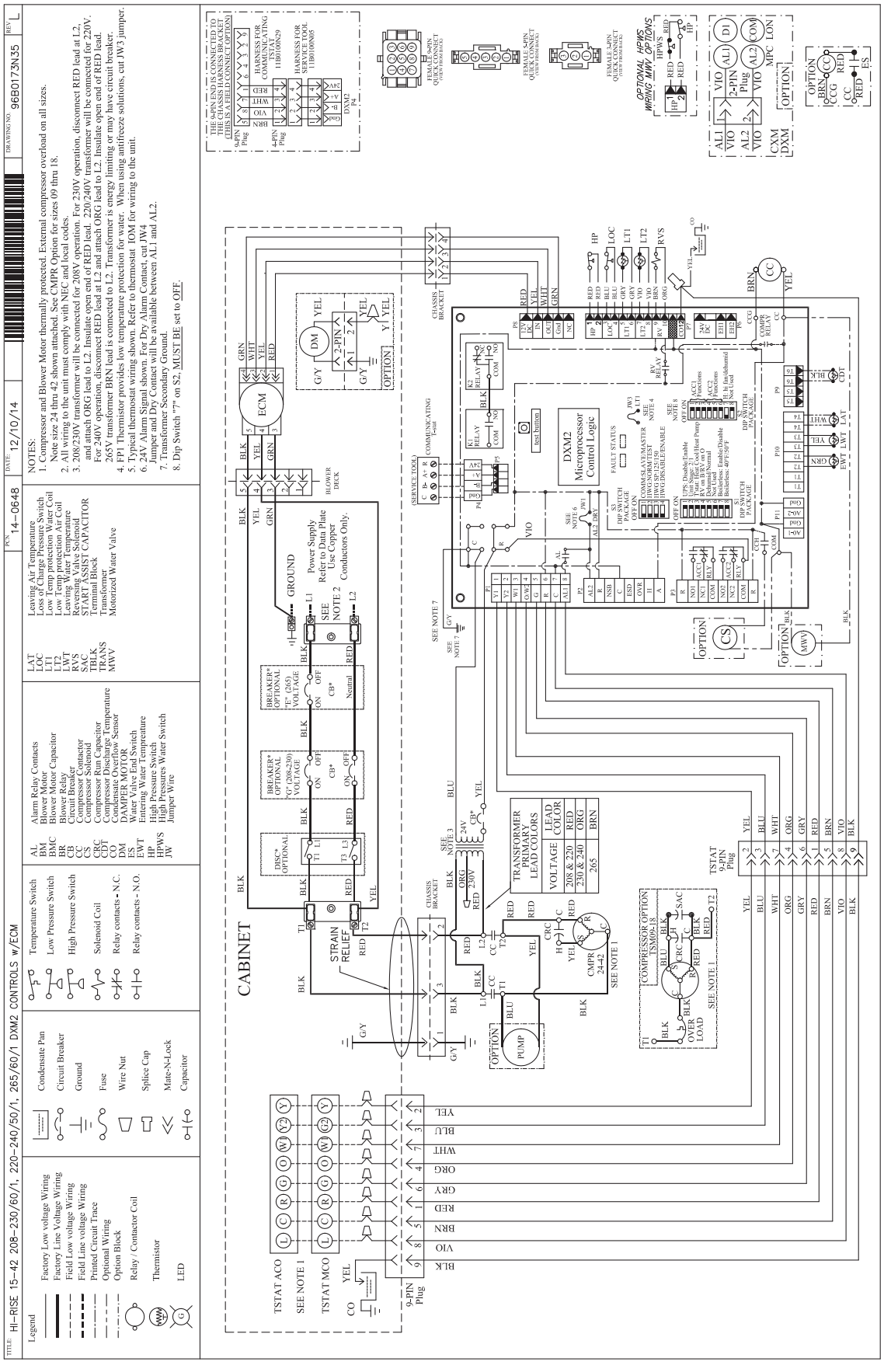
Typical Wiring Diagram – TSM15 - 36 DXM2 with ECM Motor



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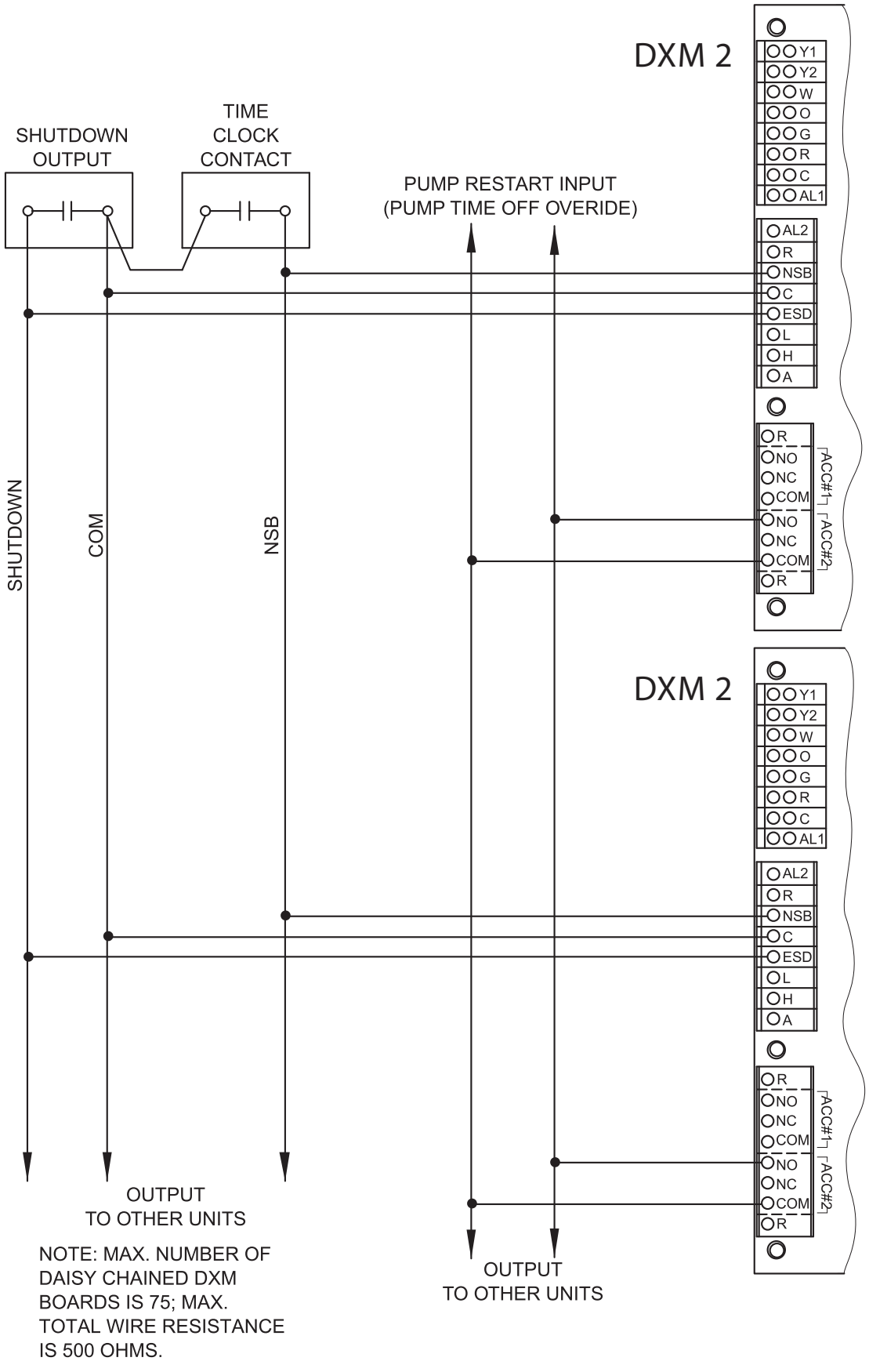
Typical Wiring Diagram – Single Phase TSM Units with DXM2 Controller with Night Setback, Emergency Shutdown, & Pump Restart



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Typical Unit - Exploded View

Major Components

1. TSM Cabinet (Furred-in)
   - A - floating condensate drain pan
   - B - drain P trap
   - C - supply air plenum
   - D - optional surface mount thermostat 2 x 4 box horizontal
   - E - optional disconnect / breaker location
   - F - upper control box (high voltage terminal blocks optional MPC, Lon)
   - G - blower assembly/motor
   - H - risers (not shown)
   - I - shutoffs (not shown)
   - J - filter panel
   - K - filter
2. TSM Chassis
   - A - compressor acoustic enclosure, compressor, water coil, reversing valve
   - B - data plate
   - C - lower control box (transformer, CXM/DXM2, contactor)
   - D - capacitor
   - E - high and low voltage locking quick connectors
   - F - air coil
3. Architectural Acoustic Return Air Panel (G)
   - A - frame
   - B - hinged inner panel
4. Hoses (Not Shown)
5. Supply Air Grille (Not Shown)
6. Thermostat (Not Shown)

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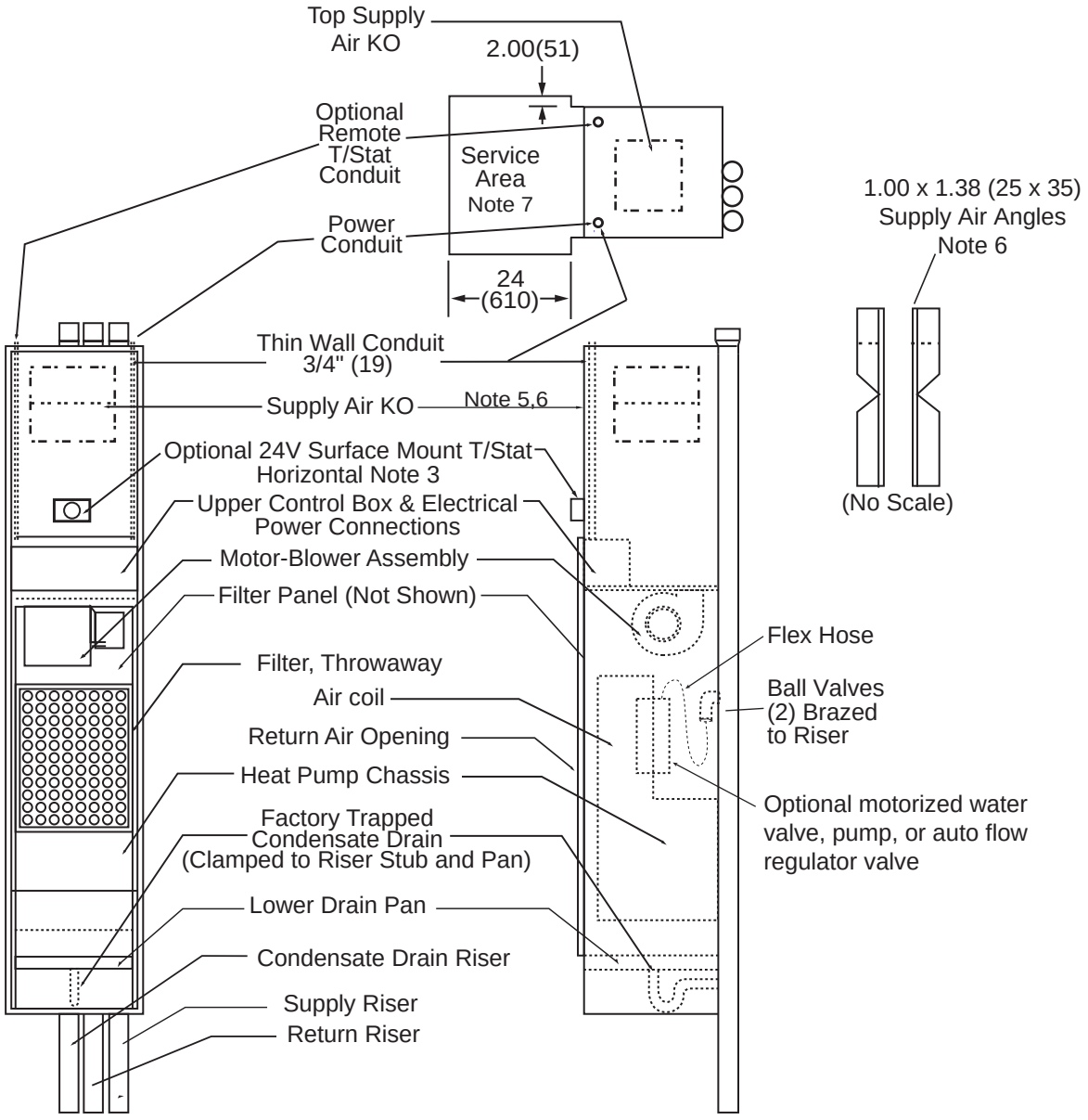
TSM – Standard Unit, Furred In Cabinet with Risers



Front (Risers Shown Style 3)

Notes:

1. All dimensions are in inches (mm).
2. The return air/control box side is defined as front of cabinet. Supply air K.O.'s and riser K.O.'s are on all panels. Supply air grilles can be on any side except riser side.
3. Units with 24v surface mount T/stat option have 2x4 box factory installed in horizontal position. Contractor must turn box before dry walling if customer is using vertical thermostat type.
4. Cabinet shown is Style 3, risers back right.
5. Supply air K.O.'s have to be field removed.
6. Supply air angles are shipped loose. Break off for 6" or 8" (152 or 203). Position inside and attach with screws.
7. Service area from finished wall, and 4"(102) wider than cabinet.

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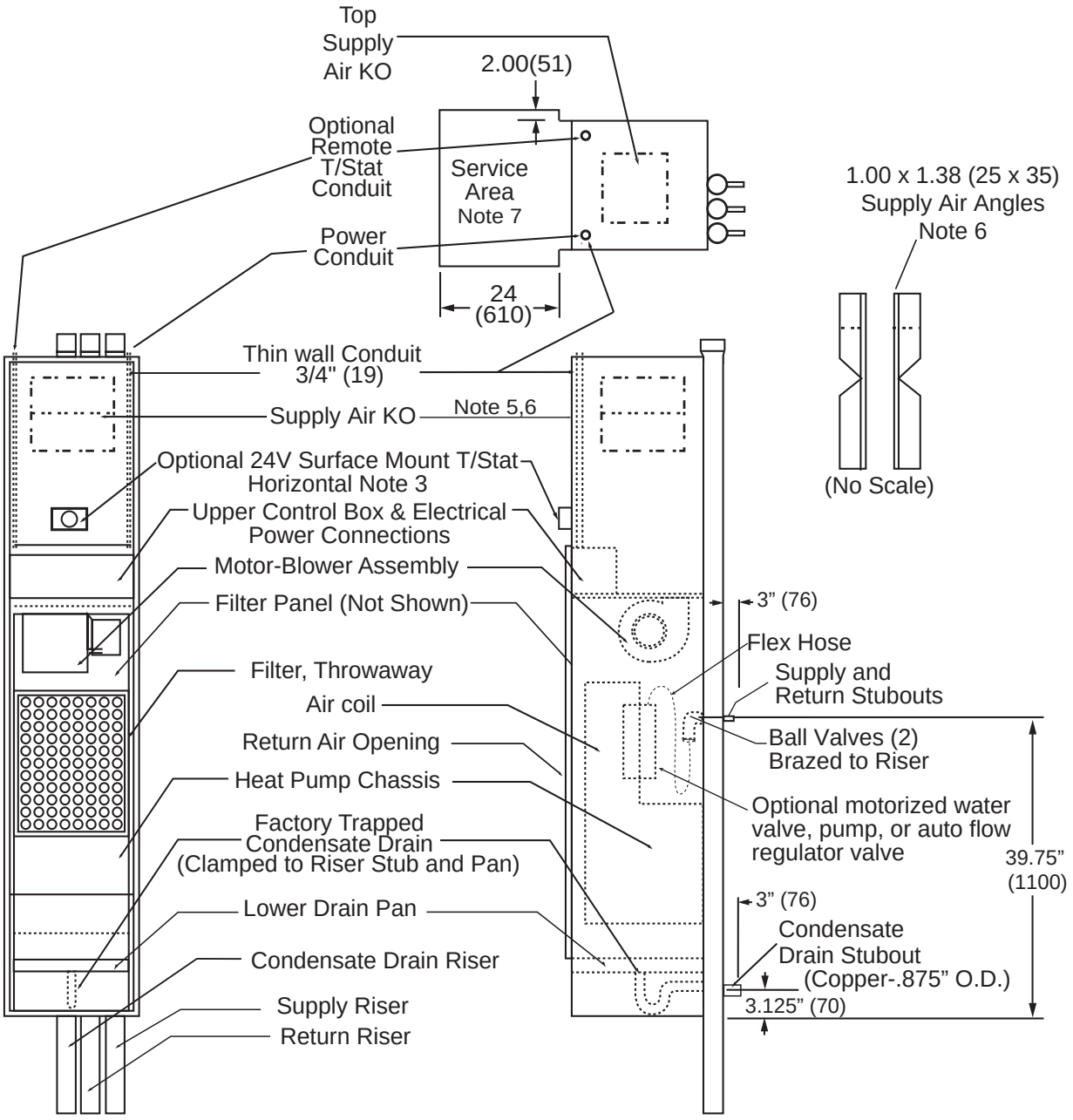
TSM – Master Unit, Furred In Cabinet



Notes:

1. All dimensions are in inches (mm).
2. The return air/control box side is defined as front of cabinet. Supply air K.O.'s and riser K.O.'s are on all panels. Supply air grilles can be on any side except riser side.
3. Units with 24v surface mount T/stat option have 2x4 box factory installed in horizontal position. Contractor must turn box before dry walling if customer is using vertical thermostat type.
4. Cabinet shown is Style 3, risers back right.
5. Supply air K.O.'s have to be field removed.
6. Supply air angles are shipped loose. Break off for 6" or 8" (152 or 203). Position inside and attach with screws.
7. Service area from finished wall, and 4" (102) wider than cabinet.
8. Installer must provide crossover water piping from Master to Slave unit. Piping must have same pressure rating or higher as riser.

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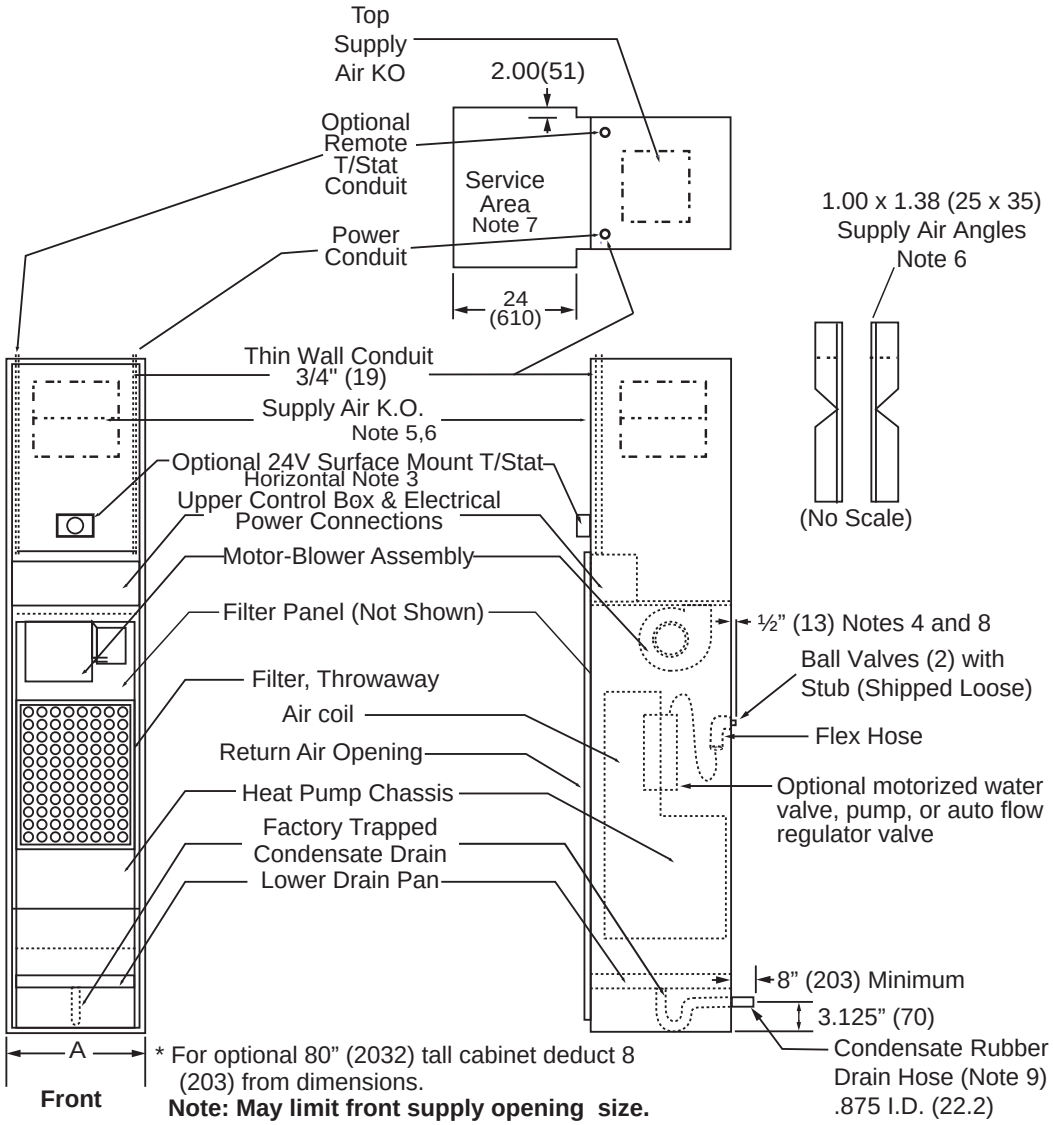
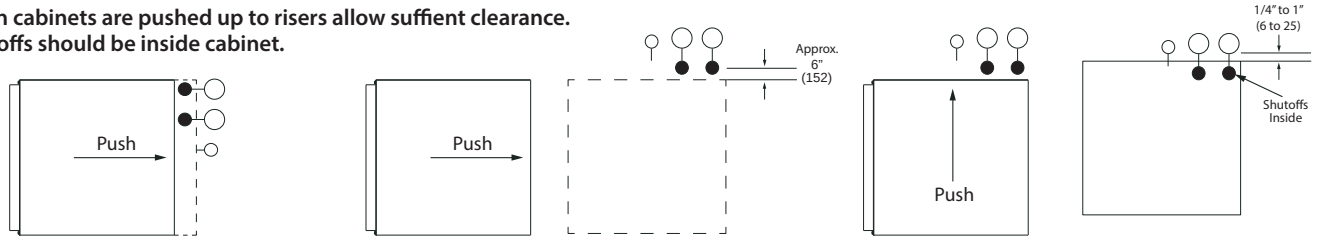
TSM – Slave Unit, Furred In Cabinet, No Risers


Top Supply Air KO
2.00(51)
Optional Remote T/Stat Conduit
Service Area Note 7
Power Conduit
24 (610)
1.00 x 1.38 (25 x 35) Supply Air Angles Note 6
(No Scale)
Thin Wall Conduit 3/4" (19)
Supply Air K.O. Note 5,6
Optional 24V Surface Mount T/Stat Horizontal Note 3
Upper Control Box & Electrical Power Connections
Motor-Blower Assembly
Filter Panel (Not Shown)
Filter, Throwaway
Air coil
Return Air Opening
Heat Pump Chassis
Factory Trapped Condensate Drain
Lower Drain Pan
½" (13) Notes 4 and 8
Ball Valves (2) with Stub (Shipped Loose)
Flex Hose
Optional motorized water valve, pump, or auto flow regulator valve
8" (203) Minimum
3.125" (70)
Condensate Rubber Drain Hose (Note 9) .875 I.D. (22.2)
A
Front
* For optional 80" (2032) tall cabinet deduct 8 (203) from dimensions.
Note: May limit front supply opening size.

Notes:

1. All dimensions are in inches (mm).
2. Return air/control box side is defined as front of cabinet. Supply air K.O.'s and riser K.O.'s are on all panels. Supply air grilles can be on any side except riser side.
3. Units with 24v surface mount T/stat option have 2x4 box factory installed in horizontal position. Contractor must turn box before dry walling if customer is using vertical thermostat type.
4. If required, installer must provide crossover water piping from Master to Slave unit. Piping must have same pressure rating or higher as riser.
5. Supply air and riser K.O.'s have to be removed in field.
6. Supply air angles are shipped loose. Break off for 6" or 8" (152 or 203). Position inside and attach with screws.
7. Service area from finished wall, and 4" (102) wider than cabinet.
8. Ball valve package is shipped loose. Field must position in cabinet copper protruding 1/2" out of cabinet) and connect to master riser stubouts.
9. Rubber drain hose is shipped loose and must be connected to drain pan and clamped both ends. Suggest running hard tubing inside and clamping inside so there is future access.

When cabinets are pushed up to risers allow suffient clearance. Shutoffs should be inside cabinet.



Step 1 Risers Opposite Return Air Opening

Step 1 Risers Adjacent to Return Air Opening

Step 2

Final Cabinet Postion

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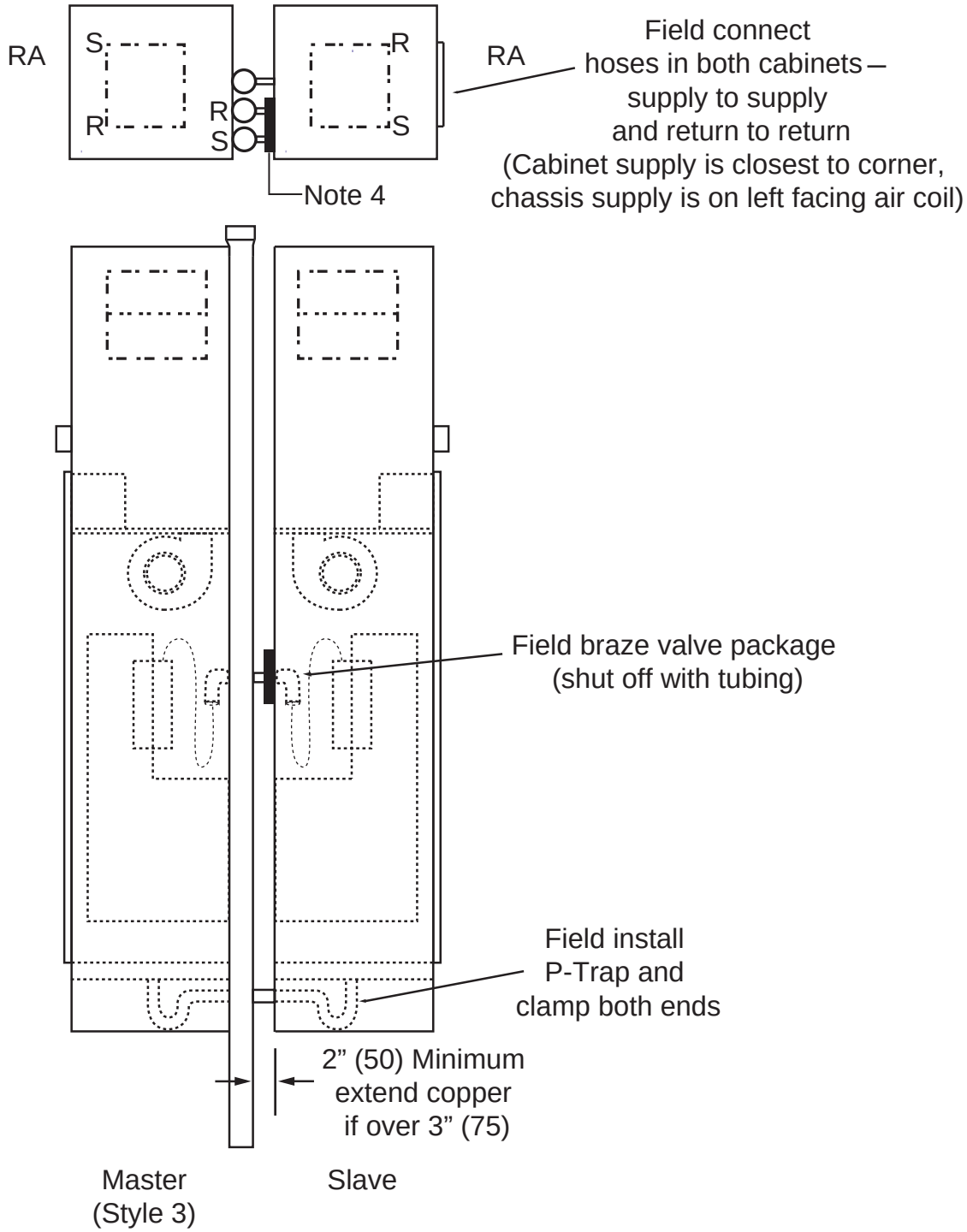
Master/Slave Cabinet Installation



Notes:

1. Contractor must meet all fire code requirements.
2. Size riser diameter for both units GPM.
3. Master/Slave means both units share common riser.

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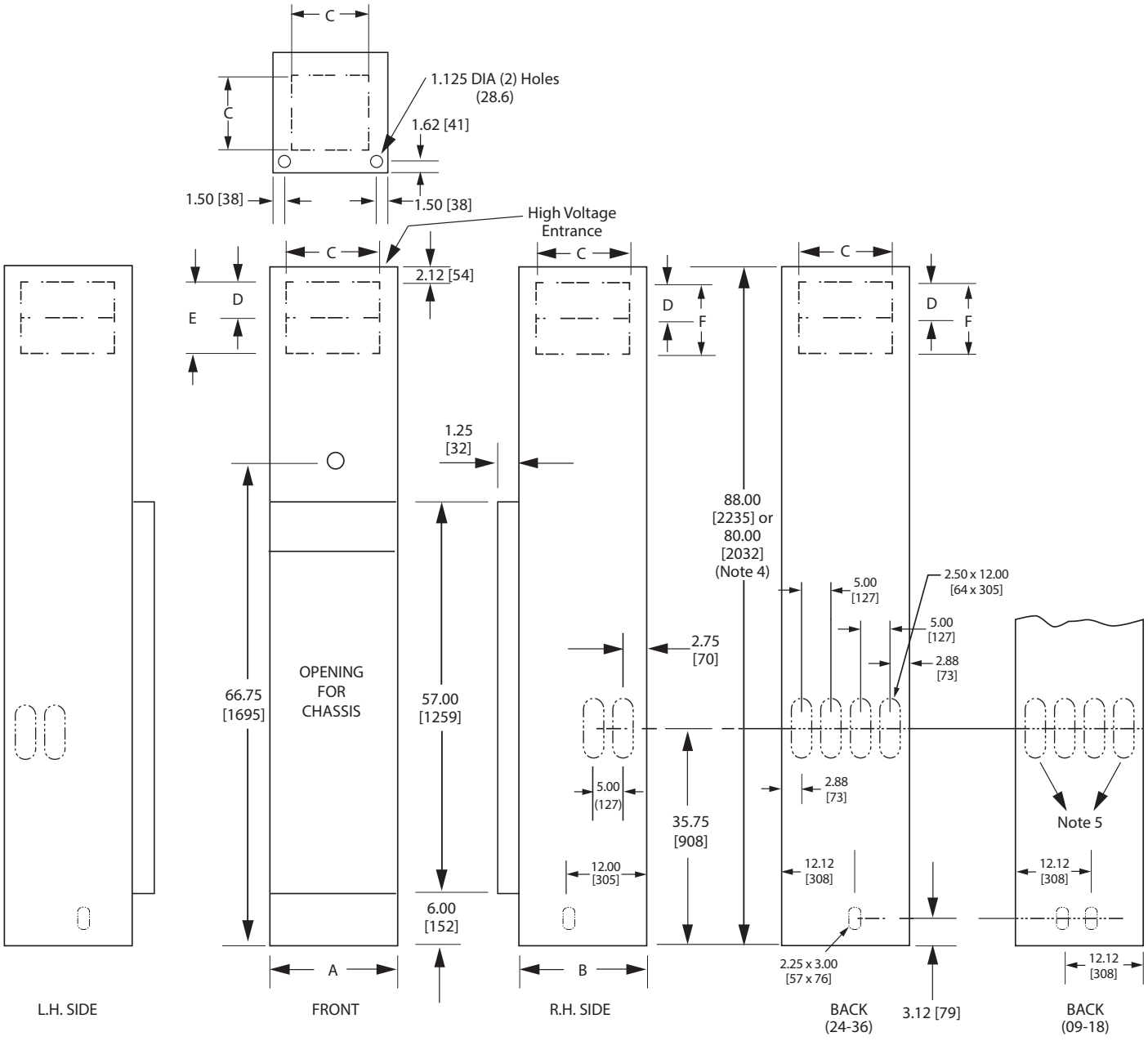
Cabinet Dimensions



Notes:

1. All dimensions are in inches (mm).
2. Cabinets have supply air and riser K.O.'s, all panels. Remove only K.O.'s necessary to configure cabinet.
3. Service area to be width of cabinet and 24" [610] from finished wall.
4. 80" cabinets only have B wide x C high supply air K.O.'s all sides.
5. For 9-18 cabinet use drain diagonally from supply and return risers.

Unit Size	ALL			88" Cabinet			80" Cabinet		
	A	B	C	D	E	F	D	E	F
TSM09 - 18	19.25 [489]	19.00 [483]	12.00 [305]	6.00 [152]	12.00 [305]	12.00 [305]	6.00 [152]	–	12.00 [305]
TSM24 - 36	24.25 [616]	24.00 [610]	16.00 [406]	8.00 [203]	16.00 [406]	16.00 [406]	6.00 [152]	–	12.00 [305]

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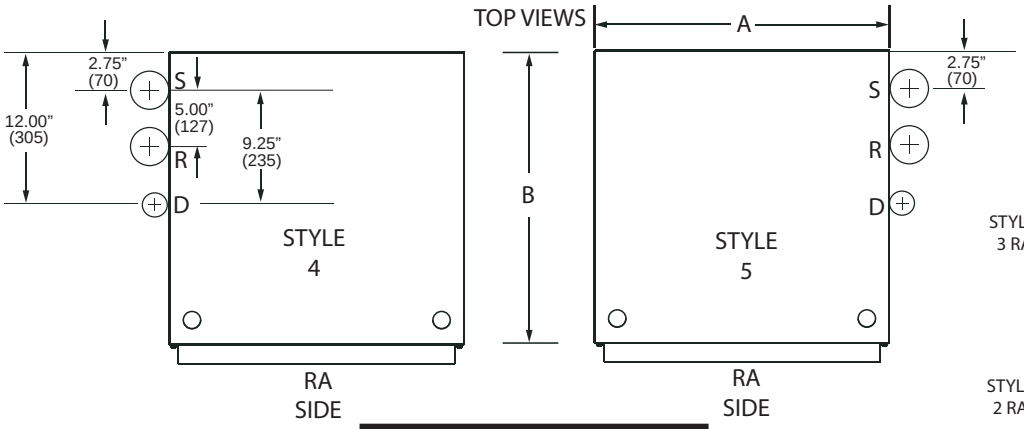
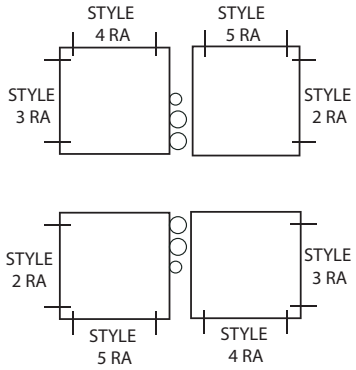
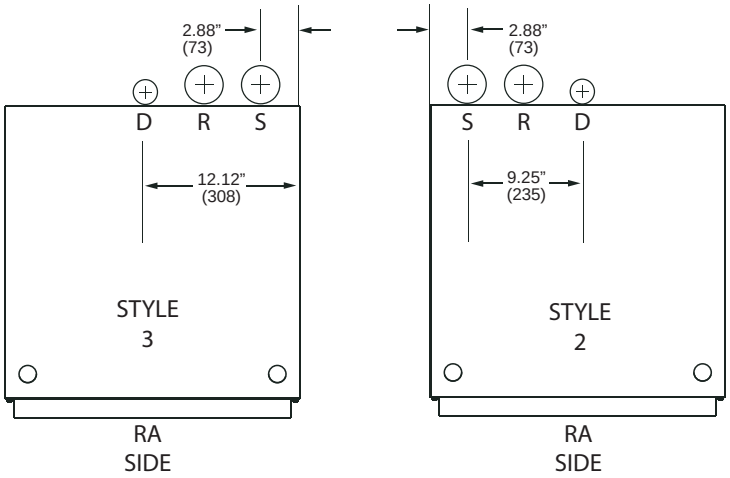
Cabinet Slot Dimensions and Riser Arrangements

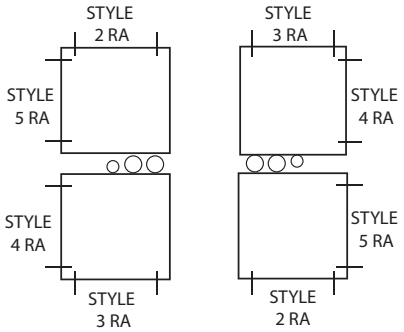


Model	A	B
09-18	19.25 [489]	19 [483]
24-36	24.25 [616]	24 [610]

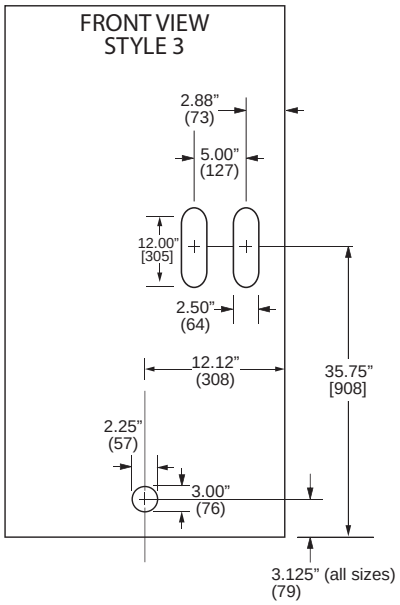


Note 8





Note 8



⚠ NOTICE! ⚠

NOTICE! Not all styles will stack above or adjacent to each other. (See Note 8).

Notes:

1. Dimensions are inches [mm].
2. Style refers to cabinet model digit 9 - riser location.
3. **Return air side is the front of the cabinet.**
4. Supply riser is closest to corner.
5. Drain is not centered on C1-C4 (09-18) cabinets.
6. Slots allow for riser stack expansion and contraction.
7. Supply and return riser stub outs are 39.75" (1100) from bottom of cabinet and is not centered in slot.
8. From floor to floor on one riser stack you can only have; all same style, styles 2 and 5; or styles 3 and 4. For master/slave units you can only have styles 3 or 4 adjacent to 2 or 5.

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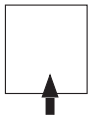
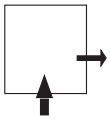
TSM Cabinet Configurations

Cabinet Model Digits 11 and 12 Describe Air Flow Configuration

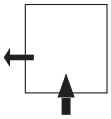
00
No Supply Air Openings



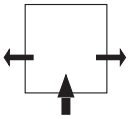
01
Right Side



02
Left Side

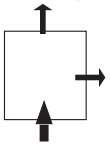


03
Left & Right Sides

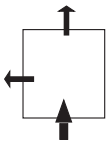


10
Back

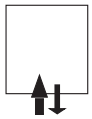
11
Back & Right



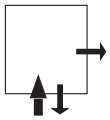
12
Back & Left



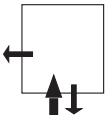
20
Front



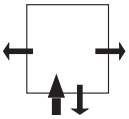
21
Front & Right



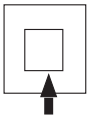
22
Front & Left



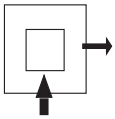
23
Front, Left, & Right



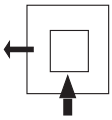
30
Top



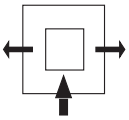
31
Top & Right



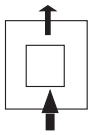
32
Top & Left



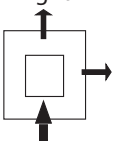
33
Top, Left, & Right



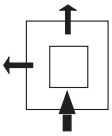
40
Top & Back



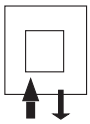
41
Top, Back, & Right



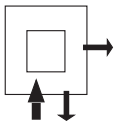
42
Top, Back & Left



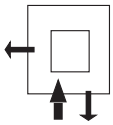
50
Top & Front



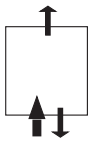
51
Top, Front, & Right



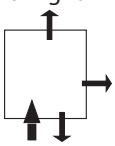
52
Top, Front & Left



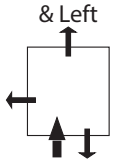
60
Front & Back



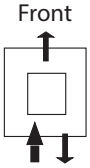
61
Front, Back, & Right



62
Front, Back, & Left



70
Back, Top, & Front



Notes:

1. **Front is return air side and control box location.**
2. **Risers can be on any side without return or supply air openings.**

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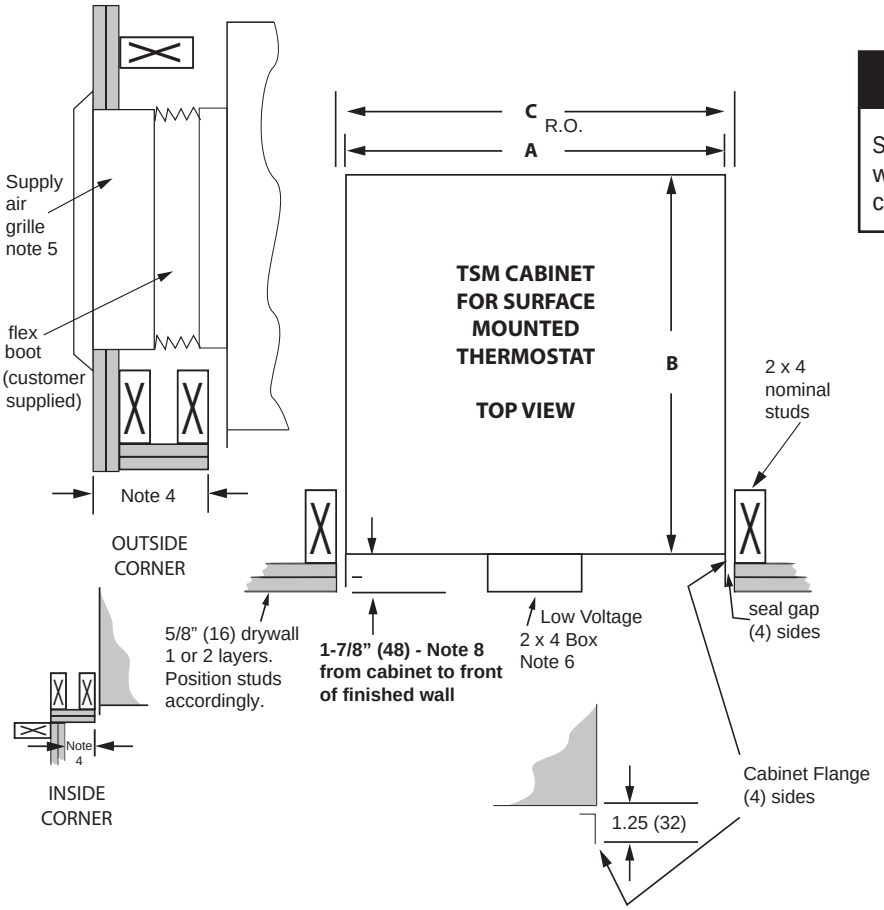
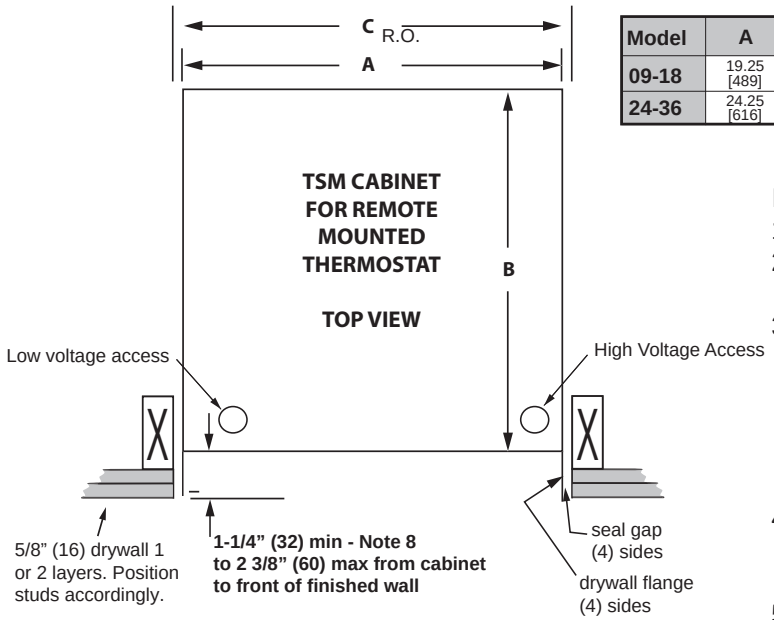
Typical Cabinet Installation - Flush

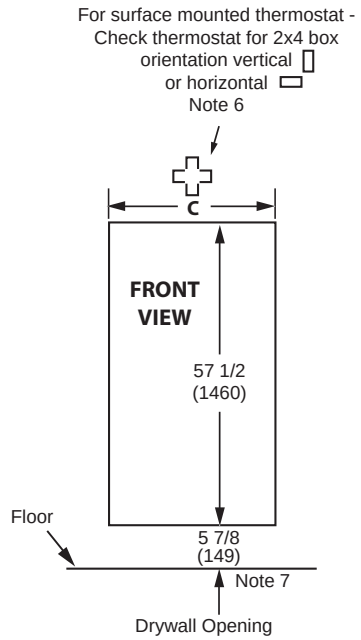



C
R.O.
A
TSM CABINET FOR REMOTE MOUNTED THERMOSTAT
TOP VIEW
B
Low voltage access
High Voltage Access
5/8" (16) drywall 1 or 2 layers. Position studs accordingly.
1-1/4" (32) min - Note 8 to 2 3/8" (60) max from cabinet to front of finished wall
seal gap (4) sides
drywall flange (4) sides

Model	A	B	C
09-18	19.25 [489]	19 [483]	19.5 [495]
24-36	24.25 [616]	24 [610]	24.5 [622]

⚠ NOTICE! ⚠

Seal between studs and cabinet flanges with weather tight foam material to prevent wall cavity air from infiltrating unit or room.



Notes:

1. All dimensions are in inches (mm).
2. Cabinet configuration will determine slab core drilling location and walls surrounding cabinet.
3. Recommend stud walls surrounding cabinet. Drywall and studs should not be attached or contacting cabinet for best sound attenuation. Where possible fill gaps with sound absorbing material. Use iso pad under cabinet. Secure cabinet to floor in two places at back.
4. Return air panel (not shown) overlaps rough opening, allow minimum of 3 1/2" (89) dry wall to corner. Do not caulk panel to wall.
5. If supply air grille does not penetrate cabinet connect with flex boot. Customer supplied top duct should also connect with flex boot.
6. Before installing dry wall, contractor must turn box if needed. Horizontal is standard.
7. If cabinet stand or ISO pad is used add to dimension.
8. For 2" MERV 13 filter set cabinet 2" minimum from front of drywall.

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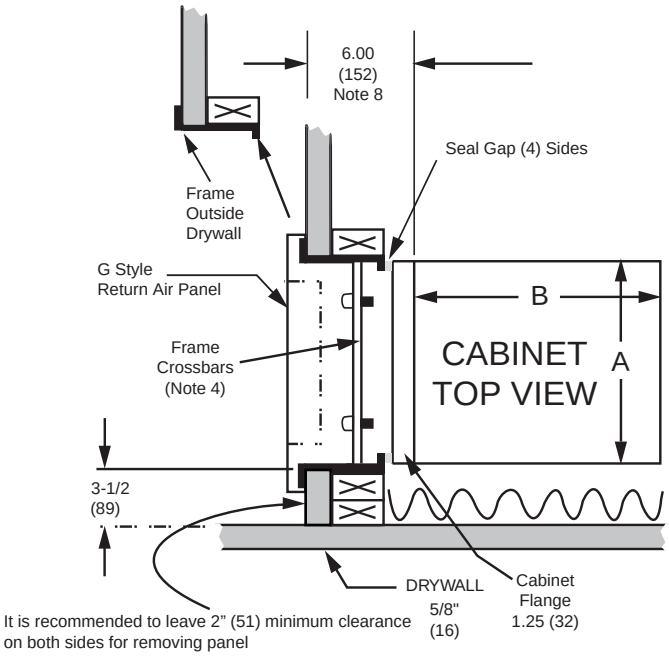
Typical Cabinet Installation - Recessed

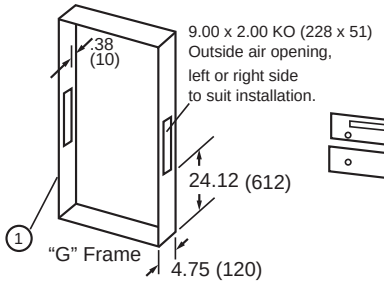


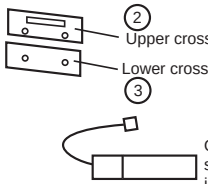
⚠ NOTICE! ⚠

- Recessed cabinet requires frame kit.
- Outside air requires motorized damper.
- Seal between the frame and cabinet with weather seal material to avoid air being pulled in from the wall cavity. Attach frame to studs not cabinet.
- Do not distort frame shim sides if required.

Notes:

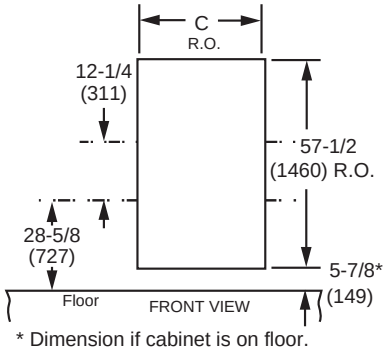
1. Cabinet configuration will determine slab core drilling location and walls surrounding cabinet.
2. Recommend stud walls surrounding cabinet. Drywall and studs should not be attached or contacting cabinet for best sound attenuation. Where possible fill gaps with sound absorbing material. Use iso pad under cabinet. Secure cabinet to floor in two places at back.
3. Return air panel overlaps rough opening, allow minimum of 3 1/2" (89) dry wall to corner. Do not caulk panel to wall.
4. G Panel attaches to frame cross bars. Cabinet must be recessed behind wall.
5. Dimensions are in inches (mm). All studs nominal 2x4, 1.50 (38) x 3.50 (89).
6. For filter access, pivot inner panel, open filter access snap. For chassis removal, remove G Panel, remove 2 cross bars, remove filter panel, slide out chassis.
7. **When outside air is required, 48A0100N04 motorized damper must be used, mixed air temperature must be no lower than 45°F (7°C), no higher than 95 DB/75 WB, and not exceed 20% of total CFM. Contractor must supply air duct, cut hole in stud, remove K.O., assemble and wire damper assembly.**
   Note: Use extreme weather temperatures.
8. For 2" MERV 13 filter set cabinet 6.25" (158) from front of drywall.
9. If drywall flanges (2) are removed, cabinet can set back 5.00 (127).





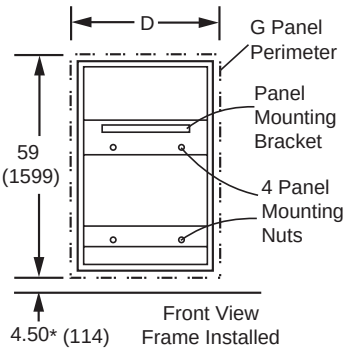
Kit Part	Qty	Description
1	1	Frame
2	1	Upper Cross Bar
3	1	Lower Cross Bar

Optional motorized damper (order seperately) 48A0100N04 may be installed on left or right side. Note 7



* Dimension if cabinet is on floor.
Add if cabinet is on stand/pad.

		Frame Kit			Panel
Kit	Size	A	B	C	D
48A0100N51	09-18	19.25 (489)	19 (483)	19-5/8 (498)	21.50 (546)
48A0100N52	24-36	24.25 (616)	24 (610)	24-3/8 (620)	25.50 (648)



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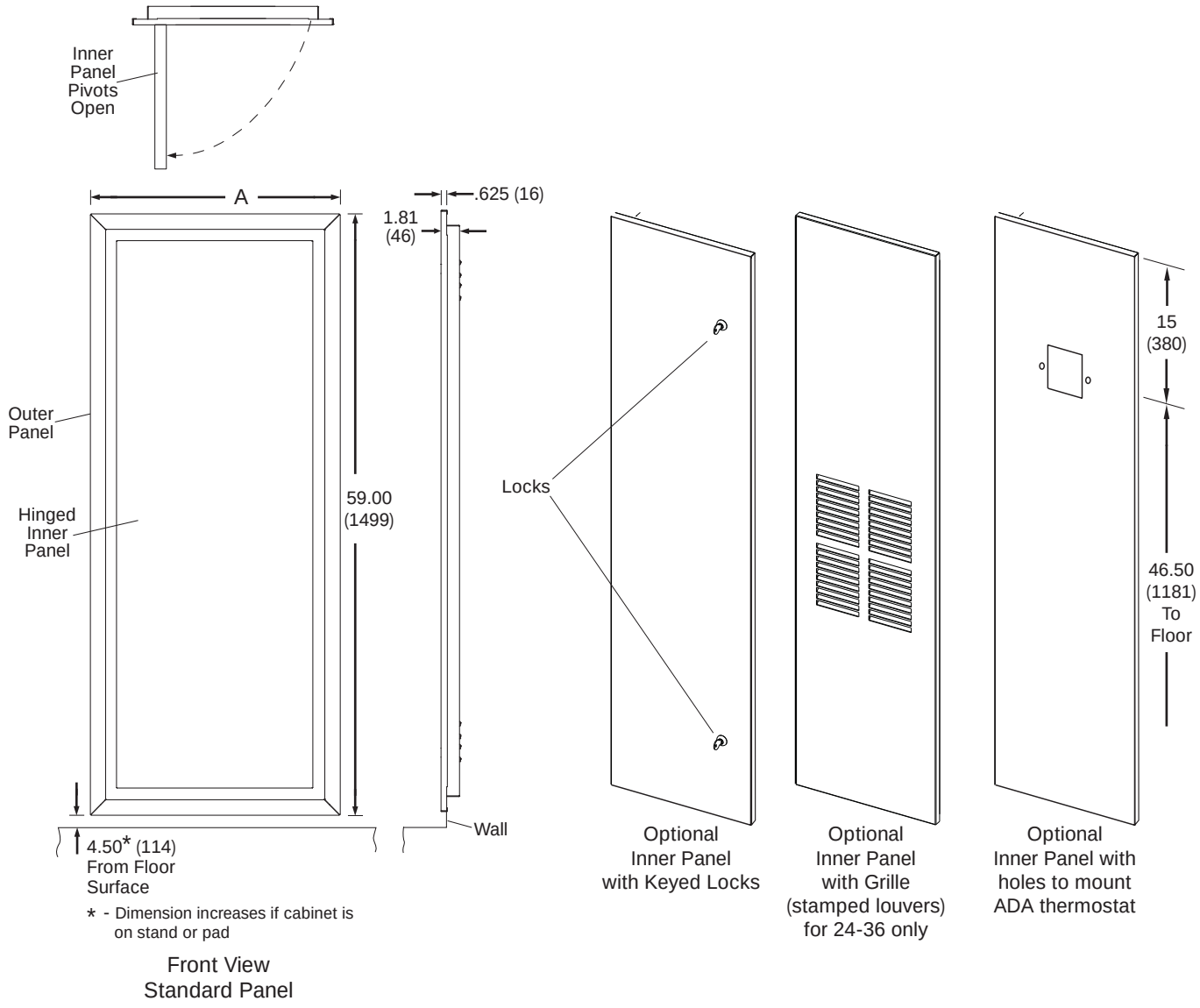
Hinged "G" Style Return Air Panel – AVHSG Series


Inner Panel Pivots Open
A
.625 (16)
1.81 (46)
Outer Panel
Hinged Inner Panel
59.00 (1499)
4.50* (114) From Floor Surface
* - Dimension increases if cabinet is on stand or pad
Wall
Front View Standard Panel
Locks
Optional Inner Panel with Keyed Locks
Optional Inner Panel with Grille (stamped louvers) for 24-36 only
15 (380)
46.50 (1181) To Floor
Optional Inner Panel with holes to mount ADA thermostat

Unit	AVHS Digit 6	A
09- 18	1	21.50 (546)
24 - 36	3	25.50 (648)

Notes:

1. Dimensions are in inches (mm).
2. Panel painted polar ice.
3. Inner panel pivots open 90°, for filter replacement without removing panel.
4. Shipped as left-hand pivot, but can be field converted to right hand. Cannot convert panel with grille, or ADA options.
5. Optional locks and/or louvered panel available.
6. Optional frame for recessed cabinet applications and damper assembly available. See page 46.

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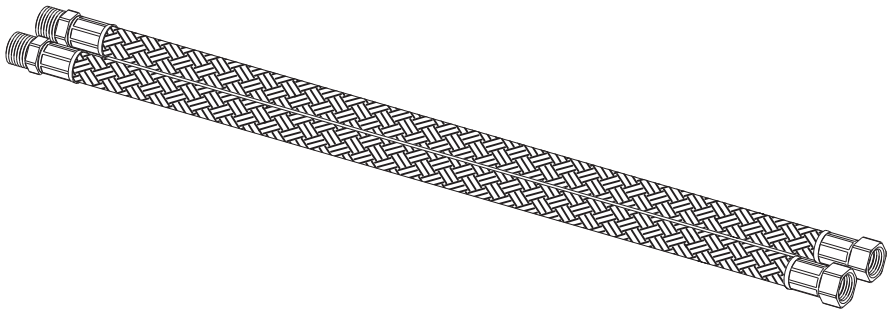
AHH Series – Stainless Steel Braided Hose Kit

Specifications:

- Designed for VHS water-source heat pump applications.
- Kevlar® reinforced EPDM core with ANSI 302/304 stainless steel outer braid.
- Fire rated materials per ASTM E 84-00 (NFPA 255, ANSI/UL 723 & UBC 8-1).
- MPT (External Pipe Thread) fitting at one end; swivel with NPSH thread connector (Internal Thread) at the other end (seals via fiber or EPDM washer, shipped inside connection).
- Swivel connection provides union between chassis and risers.
- Brass fittings, stainless steel ferrules.
- Temperature range of 15°F [9°C] to 180°F [82°C]. (Operation below 32°F requires antifreeze)
- Max. working pressure of 400 psi [2756 kPa].
- Min. burst pressure of four times working pressure.



Physical Data

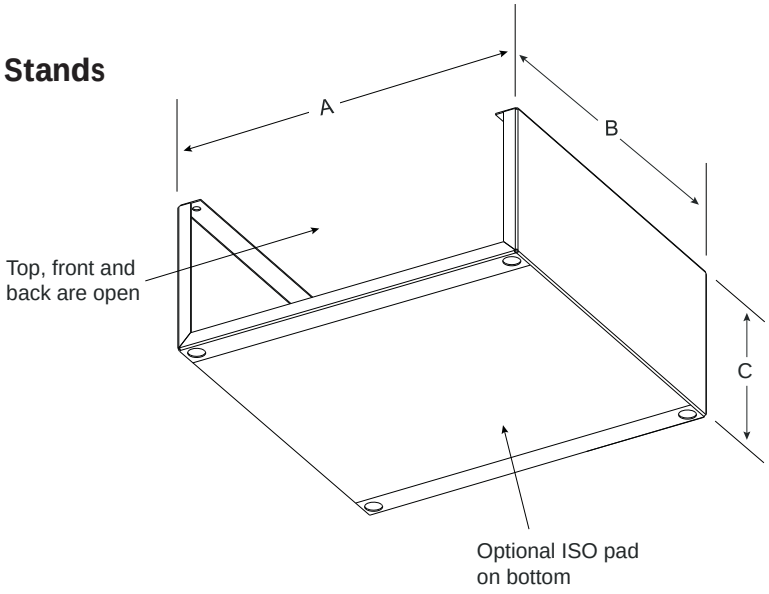
Unit	Part #	Inside Diameter inches	Length feet [cm]	Working Pressure psi [kPa]	Min. Burst Pressure psi [kPa]	Min. Bend Radius inches [mm]
09, 12	AHH0503B	0.50	3 [91]	400 [2756]	1600 [11024]	2.5 [63.5]
15, 18	AHH0753B	0.75	3 [91]	400 [2756]	1600 [11024]	4.5 [114.3]
24-36	AHH1003B	1.00	3 [91]	400 [2756]	1600 [11024]	5.5 [139.7]

ACST Cabinet Stands

Specifications

- 1" to 12" (25 to 305) tall, 1" (25) increments
- 16 Gauge galvanized steel
- Attached to cabinet with 4 screws
- Field installed
- Optional ISO pad .06" (1.5) thick

Unit	A	B	C
09-18	18.86 [479]	18.25 [464]	1 to 12 (25 to 305)
24-36	23.86 [606]	23.25 [590]	



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Supply Air Openings and Grilles

Standard cabinet openings and grille sizes. (W x H)

88" (2235) cabinet models 09-18 – front, back, or sides 12 x 12 (305 x 305) or 12 x 6 (305 x 152) and top 12 x 12 (305 x 305).
80" (2032) cabinet models 09-18 – front, back, or sides 12 x 6 (305 x 152) and top 12 x 12 (305 x 305).
88" (2235) cabinet models 24-36 – front, back, or sides 16 x 16 (406 x 406) or 16 x 8 (406 x 203) and top 16 x 16 (406 x 406).
80" (2032) cabinet models 24-36 – front, 16 x 6 (406 x 152) Only; back or sides 16 x 12 (406 x 305) or 16 x 6 (406 x 152) and top 16 x 16 (406 x 406).

Standard Grille Sizes (Nominal)

Unit Size	Supply Air Openings (Any Combination - Cabinet Sides and Ductwork)			
	1 Opening	2 Openings	3 Openings	4 or more Openings
TSM09, 12	12" x 12" [305 x 305]	12" x 6" [305 x 152]	Not Recommended	Not Recommended
TSM15 - 18	12" x 12" [305 x 305]	12" x 12" [305 x 305]	12" x 6" [305 x 152]	Not Recommended
TSM24	Not Recommended	16" x * [406 x –]	16" x ** [406 x –]	Not Recommended
TSM30	Not Recommended	16" x * [406 x –]	16" x ** [406 x –]	Not Recommended
TSM36	Not Recommended	16" x * [406 x –]	16" x ** [406 x –]	Not Recommended

Nominal Grille Size	Double Deflection Free Area (Sq. Ft)		
	Deflection 0°	Deflection 22 1/2 °	Deflection 45°
12 x 6	.30	.28	.22
12 x 12	.65	.59	.48
16 x 8	.61	.55	.44
16 x 12	.93	.85	.68
16 x 16	1.25	1.12	.90

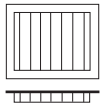
* - 88"(2235) Cabinet = 16"(406); 80"(2032) Cabinet = 12"(305)
** - 88"(2235) Cabinet = 8"(203); 80"(2032) Cabinet = 6"(152)

Notes:

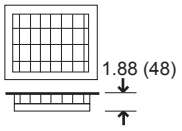
1. When selecting supply air openings/grilles consider CFM, velocity (throw), added static pressure and sound.
2. Other sizes available as special.
3. If custom grille sizes are used - area should be greater or equal to above.
4. If using more than recommended number of opening, total CFM may be reduced (PSC or ECM Motor).

Grilles are shipped loose for field installation after drywall has been finished.
Grilles are brushed aluminum or painted (polar ice).
Overall dimensions - add 1.25 (32) to nominal dimensions.

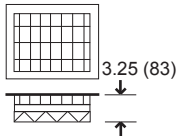
A816GA Series Grilles
Single Deflection- Adjustable vertical blades for controlling horizontal path of discharge air (Left/Right).



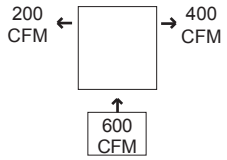
A816GB Series Grilles
Double Deflection- Adjustable vertical and horizontal blades for controlling horizontal and vertical path of discharge air. (Left/Right and Up/Down) Recommended for all standard applications.



A816GC Series Grilles
Double Deflection with Opposed Blade Damper- Addition of opposed blade damper to grille allows control of air volume (CFM) and path of discharge air. Recommended for applications requiring unequal air flow or side discharge grille(s) with additional top discharge air opening.



Unequal Air Flow- Air discharges requiring different air volumes (CFM). Use double deflection with opposed blade damper grilles.



Top Discharge- Units are designed to operate against relatively low air resistance (external static). Use of liberal duct sizing is recommended to maximize total unit air flow (CFM). Top duct outlet will offer more resistance to air flow than side outlets on the same cabinet. For top discharge only use TSL Series.

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Thermostats

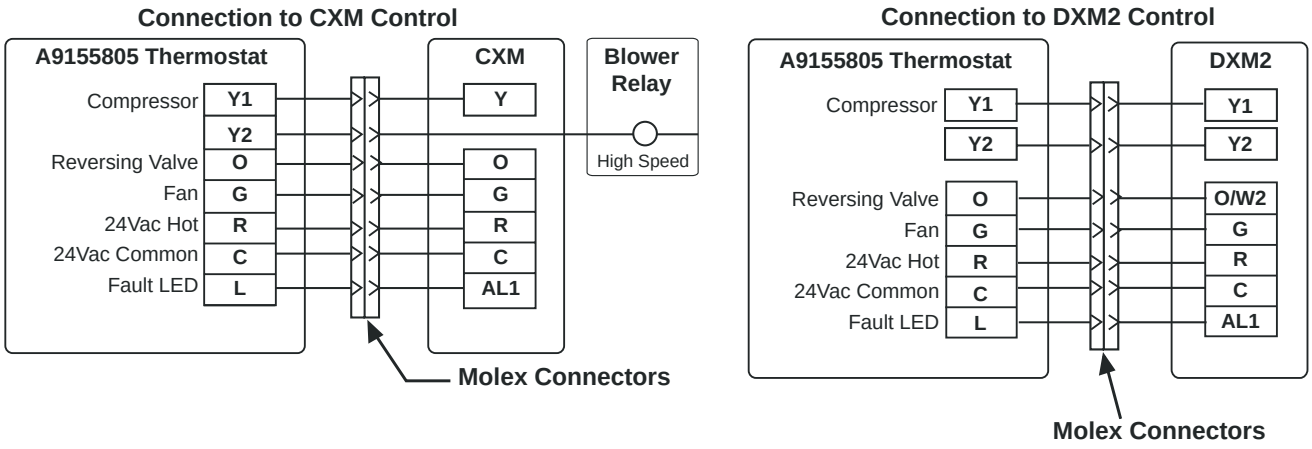
Two types of thermostats are available -
AT Series - require field to make wiring connections to screw terminals on thermostat. Cabinet construction for remote thermostat with field supplied whip (wires long enough to reach wall thermostat location) use AT Series.

A91558 Series - are the AT Series thermostats with a wire harness factory assembled, 6" long wires terminating with 9 pin molex connector. Cabinet construction for surface mount or remote mount thermostat with optional factory whip (15, 25, or 35 foot (572, 762, or 1067 cm) wires terminate with 9 pin molex for quick connection to A91558 Series thermostats.

Customer supplied thermostats should be approved by ClimateMaster Engineering Department prior to using. For cabinets with surface mount construction, field will have to cut off the molex plug and wire to thermostat per wire diagram.

All cabinets are compatible with 2 speed thermostats (G2 or Y2).

A9155805 shown below is ATP32U03C with factory wire harness (pigtail).



Thermostat Only	Thermostat Assembly with Molex Connector 6" Pigtail	CXM	DXM2	Manual Changeover	Automatic Changeover	Programmable	Digital	Fault Indicator	Setback Override	Fan Speeds	Set Temperature Limits
ATA11U01	A9155801	X	X	X	X		X	X		1	
ATA11U03	A9155802	X	X	X	X		X			2**	X
ATA22U01	A9155804	X	X	X	X		X	X		1 or 2*	
ATP32U03C	A9155805	X	X	X	X	X	X	X	X	1 or 2*	X
ATC32U02C	A9155806		X	X	X	X	X	X	X	2*	X

*Fan speed change automatic through thermostat Y2 signal.
** - Manual speed change

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TSM Options

Optional Cabinet Disconnect Switch (Non Fused)

Located on control box access door. Can be accessed through slot in "G" Panel Frame. Classified as motor disconnect. See Cabinet decoder.

Optional Cabinet Circuit Breaker

Located on control box access door. Can be accessed through slot in "G" Panel Frame. All 208/230V and 265V 15 and 20 amp classified as HACR breaker. 265V 25 amp and higher classified as supplemental breaker. See Cabinet decoder.

Cabinet Construction for surface-mounted thermostat cabinet has pre-wired 2 x 4 x 1 7/8 deep electric box mounted for horizontal thermostat. Contractor must turn prior to dry walling if field-supplied vertical thermostat is used. Wire harness ends with 9-Pin Molex quick connector for easy connection to A91557 Series thermostats or can be cut off. See Cabinet decoder.

Optional Thermostat Wire Harness (WHIP)

Low voltage wire harness 15, 25, or 35 foot ending with 9-Pin Molex quick connector. Exits cabinet on top, left front corner. Thermostat cable is rated CL-2. See Cabinet decoder. Can be encased in BX conduit as special, contact factory.

Optional Premium Seal

Located on cabinet filter panel, seal is upgraded to extruded rubber gasket for durability and long life.

Optional Cabinet Stand

Heavy gauge galvanized sheet metal stand field-attached to bottom of cabinet (or as special factory-installed for cabinets with risers attached) to lift cabinet off floor. Can order 1" to 12" (25 to 305 mm) heights (by 1" increments) without or with isolation pad for reduced transmission of vibration to the floor. Contact factory.

Optional 2" Filter

2" filter improves air filtration and reduces maintenance.

Accessory Filters (Not available for every application - check blower table for ESP)

1" (25mm) thick, MERV 8, and MERV 11
2" (50mm) thick, MERV 8, MERV 11, MERV 13

	TSM with ECM Motor				Accessory Filter Initial ESP				
Model	Max CFM	Max ESP	coil area	face velocity	Merv 8		Merv 11		Merv 13
			sq ft	fps	1"	2"	1"	2"	2"
9	500	0.25	2.5	200	0.09	0.07	0.10	0.09	0.16
12	500	0.25	2.5	200	0.09	0.07	0.10	0.09	0.16
15	700	0.3	2.5	280	0.17	0.14	0.22	0.15	0.25
18	800	0.3	2.5	320	0.20	0.16	0.29	0.19	0.28
24	950	0.3	3.4	280	0.17	0.14	0.22	0.15	0.25
30	1100	0.4	3.4	325	0.21	0.15	0.32	0.19	0.29
36	1350	0.4	3.4	400	0.26	0.21	0.44	0.24	0.34

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ECM Blower Motor (Optional)

The ECM blower motor (optional) for TSM09 - 36 is controlled directly by the DXM2 control board that converts thermostat inputs and CFM settings to signals used by the ECM motor controller. To take full advantage of the ECM motor features, a communicating multi-stage thermostat should be used (ATC32U**).

The DXM2 control maintains a selectable operating airflow [CFM] for each heat pump operating mode. For each operating mode there are maximum and minimum airflow limits. See the ECM Blower Performance tables for the maximum, minimum, and default operating airflows.

Airflow levels are selected using the configuration menus of a communicating thermostat (ATC32U0IC) or configuration/diagnostic tool (ACDU0IC and harness 11B0100N27). The configuration menus allow the installer to independently select and adjust the operating airflow for each of the operating modes. Air flow can be selected in 25 CFM increments within the minimum and maximum limits shown in the ECM Blower Performance Table. The blower operating modes include:

- First Stage Cooling (Y1 & O)
- Second Stage Cooling (Y1, Y2, & O)
- First Stage Heating (Y1)
- Second Stage Heating (Y1 & Y2)
- Fan (G with no Y1, Y2, or W)

The ECM motor for TSM 15 - 36 includes “soft start” and “ramp down” features. The soft start feature is a gentle increase of motor rpm at blower start up. This creates a much quieter blower start cycle.

The ramp down feature allows the blower to slowly decrease rpm to a full stop at the end of each blower cycle. This creates a much quieter end to each blower cycle and adds overall unit efficiency.

The ramp down feature is eliminated during an ESD (Emergency Shut Down) situation. When the DXM2 ESD input is activated, the blower and all other control outputs are immediately de-activated.

The ramp down feature (also known as the heating or cooling “Off Delay”) is field selectable by the installer. The allowable range is 0 to 255 seconds.

Airflow Configuration Screen on Communicating Thermostat or (ACDU) Service Tool.

AIRFLOW SELECTION	CFM
HEAT STAGE 1	600
HEAT STAGE 2	750
AUXILIARY HEAT	850
EMERGENCY HEAT	850
COOL STAGE 1	525
COOL STAGE 2	700
COOL DEHUMID 1	425
COOL DEHUMID 2	550
CONTINUOUS FAN	350
HEAT OFF DELAY	60
COOL OFF DELAY	30
◀ PREVIOUS	NEXT ▶

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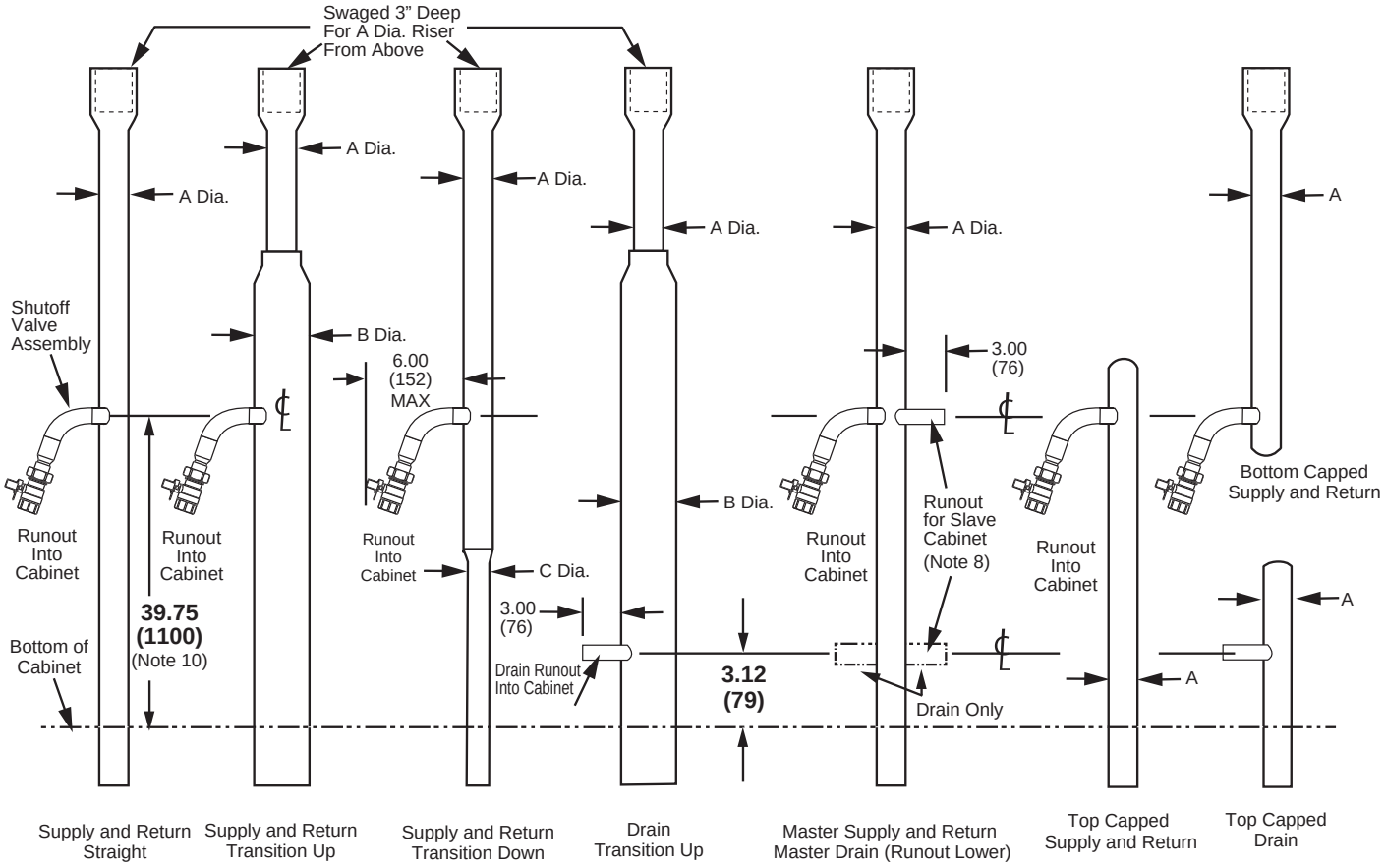
Riser Definitions



Notes:

1. You must know water flow direction to determine if cabinet requires transition up or down.
2. Transitions can only change by one diameter (1" to 1¼", 1¼" to 1½", etc.)
3. Riser transition couplings and runouts are factory brazed.
4. All risers are factory pressure tested.
5. Standard riser diameters are 1", 1¼", 1½", 2", 2½" and 3"nominal water tubing.
6. Copper Type M and L available.
7. Drain riser insulated standard. Supply and return insulated optional.
8. Master riser - contractor provides tubing from runout to slave cabinet if needed.
9. Shutoff has FPT for hose (1/2" for C1 (09), C2 (12); 3/4" for C3 (15), C4 (18); or 1" for C5 (24), C6 (30), C7 (36).

A	1.00	1.25	1.50	2.00	2.50	3.00
B	1.25	1.50	2.00	2.50	3.00	-
C	-	1.00	1.25	1.50	2.00	2.50

Note: ClimateMaster units with motorized valve option have water high pressure switches. Do not design riser stack where switch will not reset (trip - 300 PSI; Reset - 250 PSI).

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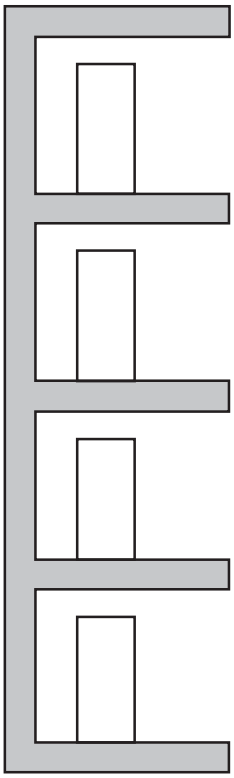
Riser GPM Definitions and Sizing

Riser GPM requirements and individual Unit GPM requirements are necessary to select the proper Riser Piping diameters. Refer to this page to determine GPM requirement, then refer to Riser Diameter Sizing Table to determine Riser Piping diameters.

Example is for bottom supply (upward flow) - bottom return (downward flow) system feed loop, both supply and return will be same GPM. GPM's are dependent upon unit load and system loop water temperatures. Please refer to Performance Charts for individual Unit GPM requirements.



Unit GPM (UGPM) = Required gallon per minute from "Performance Charts,"or GPM used in Climasize.
Note: For factory installed AFR check Flow Rate available (See Table)

Total Riser GPM (TRGPM) = The sum of, all Unit, GPM's on each Riser.

Total GPM Per Floor (TGF) = Total GPM minus the sum of Unit GPM from all floors above or below, depending on direction of flow.

Example: Four floors, Consisting of units sizes TSM36, TSM24, TSM12 and TSM09, as shown in diagram. UGPM's are 9.0, 6.0, 3.0 and 2.0 respectively.

TRGPM = 9.0 + 6.0 + 3.0 + 2.0 = 20 GPM.

Auto-Flow Regulator (US GPM) Code							
	5/8 Sweat		7/8 SWEAT				
	Unit 09	Unit 12	Unit 15	Unit 18	Unit 24	Unit 30	Unit 36
C	1.5	–	–	–	–	–	–
D	2.0	2.0	–	–	–	–	–
E	2.5	2.5	2.5	–	–	–	–
F	3.0	3.0	3.0	3.0	–	–	–
G	–	3.5	3.5	3.5	–	–	–
H	–	–	4.0	4.0	4.0	–	–
J	–	–	–	5.0	5.0	5.0	–
K	–	–	–	–	6.0	6.0	6.0
L	–	–	–	–	7.0	7.0	7.0
M	–	–	–	–	–	8.0	8.0
N	–	–	–	–	–	–	9.0
P	–	–	–	–	–	–	10.0

Upward Flow:
Floor 1: TGF = 20 Add all floor GPM's (TRGPM).
Floor 2: TGF = 11 Total GPM minus floor 1 GPM.
Floor 3: TGF = 5 Total GPM minus floors 1 and 2 GPM's.
Floor 4: TGF = 2 Total GPM minus floors 1, 2, and 3 GPM's.

Downward Flow:
Floor 4: TGF = 20 Add all floor GPM's (TRGPM).
Floor 3: TGF = 18 Total GPM minus floor 4 GPM.
Floor 2: TGF = 15 Total GPM minus floors 1 and 2 GPM's.
Floor 1: TGF = 9 Total GPM minus floors 1, 2, and 3 GPM's.

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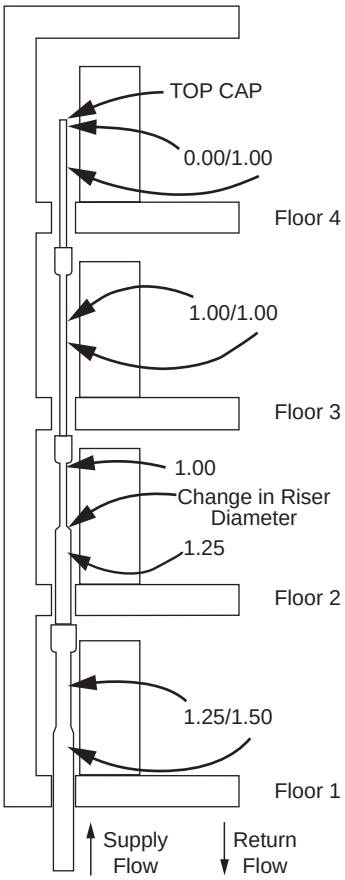
Riser Diameter Sizing

Refer to Riser GPM Definitions and Sizing for the prefix to this example.

Each TSM Vertical Stack unit has three riser pipes: supply, return, and drain. The following example will be for Supply and Return riser pipe (from the top floor to the bottom floor), supply flow up and return flow down.

Note: If flows are both same direction, you will have to create two table 3's, Supply and Return



From Table 1 (below) determine the proper riser diameter needed to satisfy the required GPM's at each unit. Refer to Table 2 (below) for a summary.

Top Cap - Top half of riser is eliminated and sealed.
Bottom Cap - Bottom half of riser is eliminated and sealed.

The following nomenclature is used to designate the diameters at the top (always first) and bottom of each unit.

- 0.00/1.00 - Indicates top cap/1" bottom.
- 1.00/1.00 - Indicates 1" top/bottom.
- 1.00/1.25 - Indicates 1" top/1.25" bottom.
- 1.25/1.50 - Indicates 1.25" top/1.50"bottom.
- (from this we develop Table 3)

Note: Transitions limited to 1 nominal diameter size larger or smaller within each floor (cabinet).

Table 1

Maximum GPM	**10**	**16**	**23**	**45**	**80**	**135**
Nominal Riser Diameter	1”	1-1/4”	1-1/2”	2”	2-1/2”	3”

Max GPM for 1" to 1½"sized for 4 FT per second maximum velocity
Max GPM for 2" to 3" sized for maximum Frictional Loss Pressure Drop= 4 FT/100 FT

Note:
Max GPM per NABB recommendation. Never exceed 6.5 FPS, excessive noise and abrasion will occur.

Table 2

Floor	TGF	Diameter From Table 1
4	2	1” [25.4]
3	5	1 [25.4]
2	11	1.25” [31.8]
1	20	1.50” [38.1]

Table 3

Nomenclature per Unit	Description
0.00/1.00	Top Cap, w/1” Bot Feed
1.00/1.00	1” Full Length Riser
1.00/1.25	1” Top, 1.25” to 1st Floor
1.25/1.50	1.25” Top, 1.50" Bottom

Table 4 (From IMC-2012 Table 307.2.2)

Drain Diameter	Max Tonnage
1" [25 mm]	40
1¼" [32mm]	90
1½" [38mm]	125
2" [51mm]	250

Values from Table 3 are to be entered on the Riser Piping Schedule of EZ Order.
Top diameter must match bottom diameter of floor above.

To calculate drain riser diameter, add up unit tonnage and use Table 4. Example has 6¾ tons, so 1" diameter is adequate.

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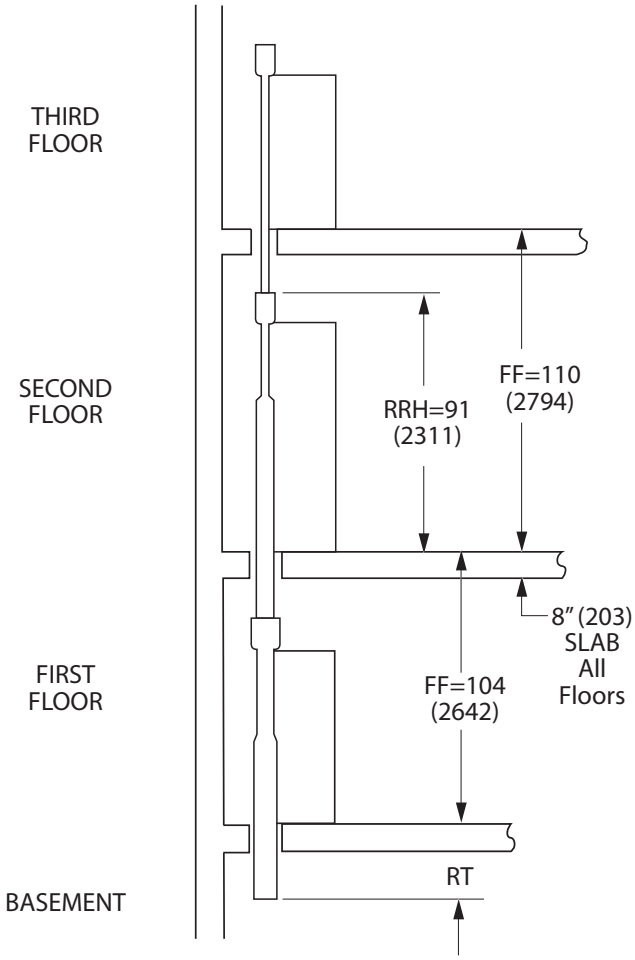
Riser Length Definitions and Sizing



Total Riser Length (L) = FF of floor below + 2"(51)
FF - (RRH + RT) + 4" (102).

Floor To Floor Height (FF): Distance from top of unit slab to top of above slab.

Room Riser Height (RRH): Cabinet height + 3" (76).

Riser Tail Piece (RT): Length of riser extending down from the cabinet. Riser tail piece must extend a minimum of 5" (127) below slab.

Slab thickness (ST); Slab thickness plus and additional material added to slab prior to setting cabinets.

Example 1 - Calculating Riser Length

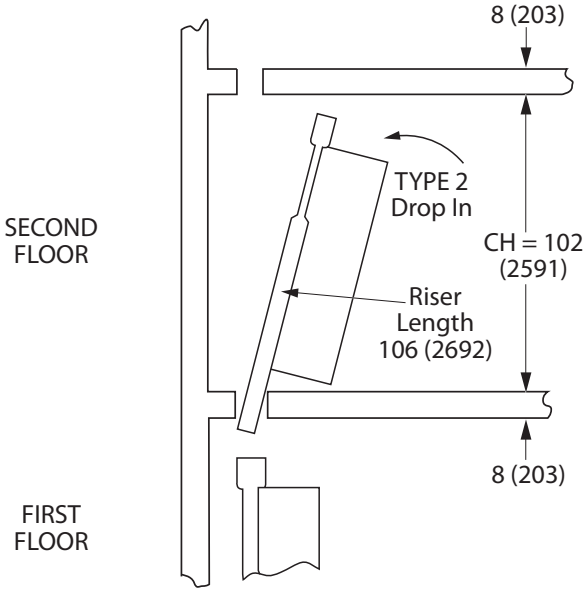
SECOND FLOOR RISER LENGTH
Slab = 8" (203)
Cabinet Height = 88" (2235)

Use FF from first floor
L = FF + 2"(50) = 106 (2692)
RRH = 91 (2311)
RT = 15 (381)

THIRD FLOOR RISER LENGTH
Use FF from second floor
L = 112 (2844)
RRH = 91 (2311)
RT = 21 (533)

Notes:

1. Always use bottom of cabinet for calculations. If optional stand is used, everything raises dimension of stand.
2. If riser maximum is exceeded or RT is less than slab + 5" (127) see riser extension sizing.
3. Complete all core drilling before setting cabinets, openings must be aligned and plumb.
4. Set from lowest floor up.
5. If risers are shipped separate they are bulk shipped to minimize shipping cost.
6. Dimensions are inches (mm).



Example 2 - Checking Length for drop in to confirm acceptable

L = 106 (2591) TYPE 2 drop in
Slab Slot = See slab slot chart for width and length.

Clear Height (CH) and Riser Length (L) are used to determine slab slot dimensions so riser will pass through slot without hitting ceiling.

CH = FF - ST

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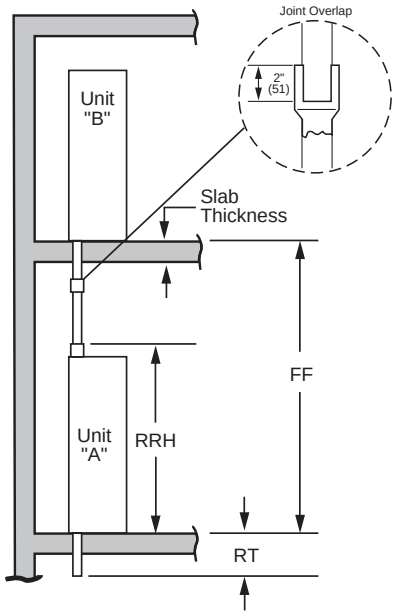
Riser Extension Definitions and Sizing



Riser Extension Length: Start with the floor to floor Dim. (FF) From this subtract the room riser height and tail piece length. Then add 4" (102) for the two joint overlaps.

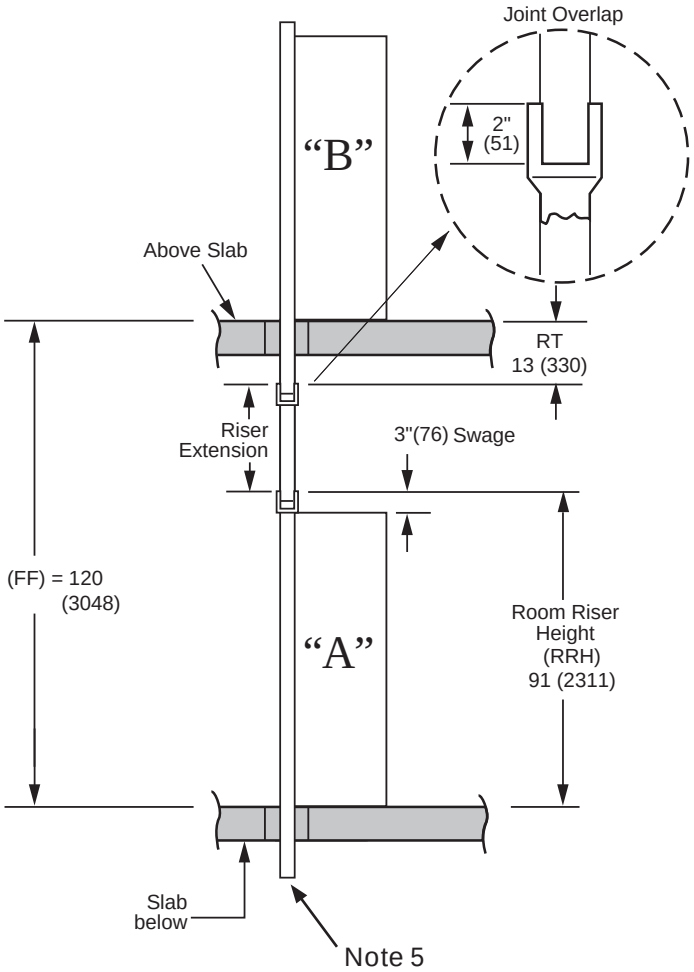
Riser Extension Length = FF - (RRH + RT) + 4" (102).

Riser Tail Piece (RT): Length of riser extending down from the cabinet. Riser tail piece must extend a minimum of 5" (127) below slab.

Room Riser Height (RRH): Cabinet height + 3" (76).

Floor To Floor Height (FF): Distance from top of unit slab to top of above slab. Slab thickness (ST); Slab thickness plus and additional material added to slab prior to setting cabinets.

Special care must be taken in sizing riser lengths and tail piece lengths when:
A) Riser extensions are used.
B) Floor to floor heights vary.
C) Slab thickness varies from floor to floor.



Example: Cabinet = 88
Floor to floor (FF) = 120" (3048)
Room Riser Height (RRH) = 91" (2311)
RT = 13" (330).

Riser Extension: 120" - (13" + 91") + 4" = 20".
3048 - (330 + 2311) + 102 = 508 mm.

Notes:

1. Example shown - riser extensions would be ordered with "A" and assembled between "A" and "B".
2. Riser "A" Top and Riser "B" bottom must be the same diameter. Extensions cannot transition.
3. Extensions are shipped loose, bulk shipped to minimize shipping cost.
4. Dimensions are inches (mm).
5. Any extension below "A" order in special section of EZ.

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Setting Cabinet

⚠ NOTICE! ⚠

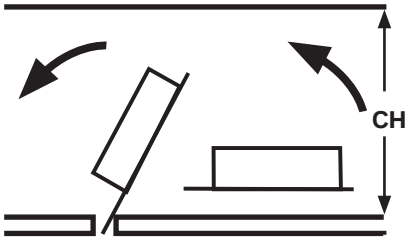
Before locating riser slab slot in floor, review plans and all information in this submittal regarding cabinet, risers, slab slot, rotation into slot, clear height and the relationship of all.

To determine the slab slot size required for the risers and to determine if clear height is OK for unit installation, use the example 2 on riser length page and slab slot charts on the next page.

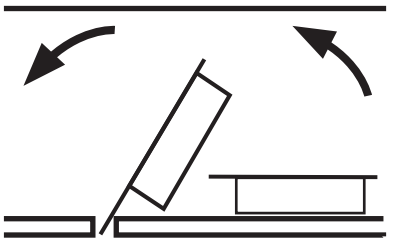
To use the charts you will need the clear height of the room the unit is in, riser length, diameter, and type of installation. (See below)

Rotating Cabinet with Risers Into Position

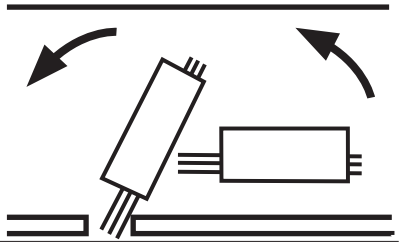
Type 1 Single Units
With a minimum clear height of 93" (2362). Start with the riser side down, lift and insert risers into slot, rotate upward, slowly pass risers through slot, set cabinet on floor.



Type 2 Single Units
With a minimum clear height of 95" (2413). Start with the side opposite of the risers down, lift and insert risers into slot, rotate upward, slowly pass risers through slot, set cabinet on floor.



Type 3 Single Units
With a minimum clear height of 94" (2388). Start with the risers on either side, lift and insert risers into slot, rotate upward, slowly pass risers through slot, set cabinet on floor.



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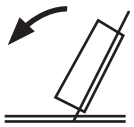
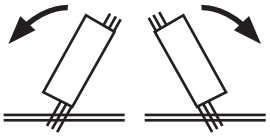
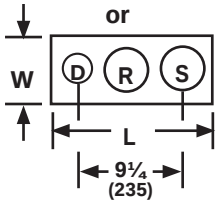
Slab Slot Chart - 3 Pipe

3 Pipe Standard 88" Cabinet

Slab Slot Size		
Type of Installation		
Type 1	Type 2	Type 3
		
W x L	W x L	W x L

Riser Stack Patterns

For Cabinet Styles 2 and 5



For Cabinet Styles 3 and 4

Clear Height is Floor to Ceiling Dimension

Slab Slot for Cabinets with Risers

Model	Clear Height		Riser length		Type of Installing Cabinet Through Slot					
					Type 1		Type 2		Type 3	
	in	mm	in	mm	in	mm	in	mm	in	mm
09-18	105	2667	115	2921	8 x 13 1/2	203 x343	6 1/2 x 13 1/2	165 x 343	6 1/2 x 16	165 x 406
	100	2540	110	2794						
	98	2498	108	2743						
	96	2438	106	2692						
	95	2413	105	2667						
	94	2387	104	2641						
	93	2362	103	2616						
24-36	105	2667	115	2921	9 x 13 1/2	229 x 343	7 1/2 x 13 1/2	190 x 343	6 1/2 x 16 1/2	165 x 419
	100	2540	110	2794						
	96	2498	108	2743						
	95	2413	105	2667						
	94	2387	104	2641						
	93	2362	103	2616						

Chart dimensions for 3"(76.2) supply and return risers with insulation and 2" drain riser, 88" (2235)cabinet, and 8"(203) slab
Clear height is dimension from floor to ceiling. Riser length is clear height plus slab thickness plus 2" (50).
For 2" (50.8)risers setting by any Type 1,2, or 3 reduce width by 1" (25) also Type 3 reduce length by 1" (25)
For 1" (25.4) risers setting by any Type 1,2, or 3 reduce width by 2" (50) also Type 3 reduce length by 2" (50)
Opening centerline must be aligned from floor to floor
Contractor is responsible to meet all codes and regulations.

Slab Hole if Risers Ship Loose and Installed Before Cabinet

Model	Clear Height		Riser Length		Riser Diameter					
					3	76.2	2	50.8	1	25.4
	in	mm	in	mm	in	mm	in	mm	in	mm
All	105	2667	115	2921	6 1/2	165	5 1/2	140	4 1/2	114
	100	2540	110	2794						
	96	2438	106	2692						
	95	2413	105	2667						
	94	2387	104	2641						
	93	2362	103	2616						

Dimensions for 3"(76.2) risers with insulation and 8" (203) slab
Clear height is dimension from floor to ceiling. Riser length is clear height plus slab thickness plus 2" (50).
Opening centerline must be aligned from floor to floor
For risers over 100" (2540) using extensions with clear height equal to riser length or more, the hole size can be riser diameter plus 1" (25mm).
If riser diameter is not shown use next larger size.
Contractor is responsible to meet all codes and regulations.

See pages 59 and 60 for examples.

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Shipping

Units Are Shipped FOB Factory

TSM Chassis can be shipped 2 ways.
1. Upright in carton 4 per pallet, see figure 1.
2. Upright inside cabinet (risers shipped separate or customer supplied) 4 per pallet, see figure 1.

TSM Cabinet without risers attached can ship upright 4 per pallet, see figure 1.

TSM Cabinet with risers attached must be shipped horizontal and normally on dedicated open flat bed trailer either 3 or 6 per pallet, see figure 2 and 3. Cabinets are palletized to maximize shipping density then grouped by unit size, building, and floor where possible. Pallets are shrink wrapped and flat bed load is tarped for protection.
Special shipping accommodations can be provided. Request added cost before quoting job, shipping cost could increase significantly and any additional charges will be billed. Some examples include, end fork pallets, reduced number of units per pallet, palletized specifically by riser, by floor, or over crating.

Vertical Shipping					
Description	Per 4 pack on pallet			Aprox. Quantity Per 53 foot Box Trailer	Approximate Weight per pallet
	Length	Width	Height		
Chassis 09-18	40	40	49	120 single stacked	500 lbs
Chassis 24-36	50	48	51	96 single stacked	750 lbs
Chassis 09-18	40	40	98	240 double stacked	500 lbs
Chassis 24-36	50	48	102	192 double stacked	750 lbs
Slave cabinet 09-18	43	43	85/93	112 single stacked	450 lbs
Slave cabinet 24-36	53	53	85/93	72 single stacked	700 lbs
Cabinet with Chassis 09-18	43	43	85/93	112 single stacked	960 lbs
Cabinet with Chassis 24-36	53	53	85/93	72 single stacked	1450 lbs

Shipping Height 85" for 80" cabinet and 93" for 88" cabinet
Small and Large cabinets can be mixed on some loads
88” Cabinets cannot have stands factory assembled, must ship loose or ship horizontal.

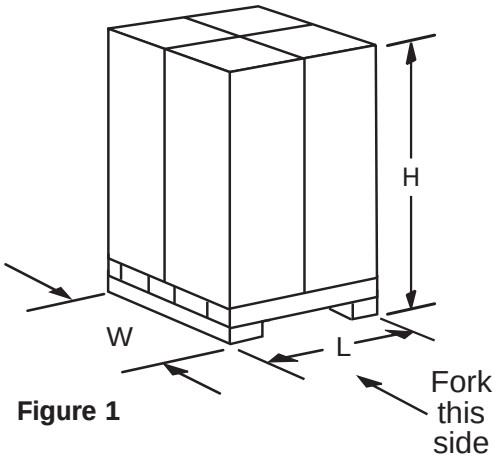

Figure 1

Horizontal Shipping							
Description	Number of cabinets per pallet	Pallet			Up to 110" Long Riser Aprox. Quantity Per 48 foot open flat bed Trailer	111" to 115" Long Riser Aprox. Quantity Per 48 foot open flat bed Trailer	Approximate Weight Per Pallet
		Length	Width	Height			
Cabinet 09-18	4	*	26	88	60	48	800 lbs
	8	*	50	88	60	48	1600 lbs
Cabinet 24-36	3	*	30	87	45	36	800 lbs
	6	*	59	87	45	36	1600 lbs

*- For length of pallet add 5” to riser length

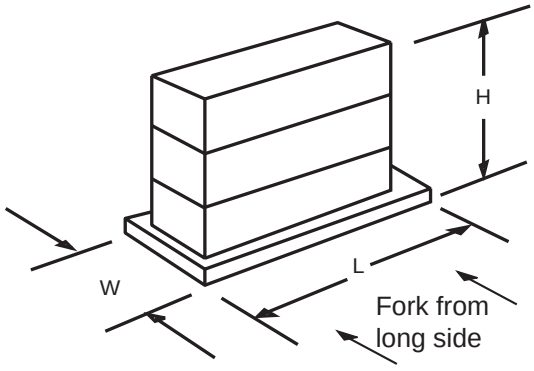

Figure 2

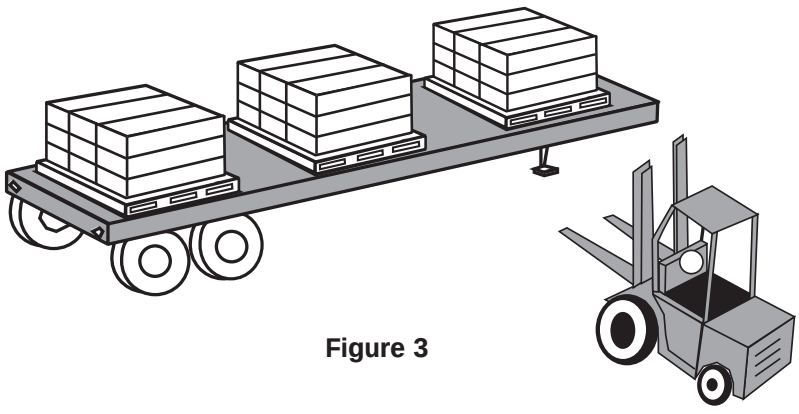

Figure 3

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Tranquility® Modular - TSM Series
Engineering Specifications – Page 1

General:
Furnish and install ClimateMaster Tranquility® "TSM Vertical Stack" Water Source Heat Pumps, as indicated on the plans with capacities and characteristics as listed in the schedule and the specifications that follow.

Units shall be supplied completely factory built capable of operating over an entering water temperature range from 20° to 120°F (-6.7° to 48.9°C) as standard. Equivalent units from other manufacturers may be proposed provided approval to bid is given 10 days prior to bid closing. All equipment listed in this section must be rated and certified in accordance with Air-Conditioning, Heating and Refrigeration Institute/International Standards Organization (AHRI / ISO 13256-1). All equipment must be tested, investigated, and determined to comply with the requirements of the standards for Heating and Cooling Equipment UL-1995 for the United States and CAN/CSA-C22.2 NO.236 for Canada, by Intertek Testing Laboratories (ETL). The units shall have AHRI / ISO and ETL-US-C labels.

All units shall be fully quality tested by factory run testing under normal operating conditions as described herein. Quality control system shall automatically perform via computer: triple leak check, pressure tests, evacuation and accurately charge system, perform detailed heating and cooling mode tests, and quality cross check all operational and test conditions to pass/fail criteria. Detailed report card will ship with each unit displaying status for critical tests and components. **Note: If unit fails on any cross check, it shall not be allowed to ship. Serial numbers will be recorded by factory and furnished to contractor on report card for ease of unit warranty status. Units tested without water flow are not acceptable.**

Basic Construction:
The cabinet panels shall be fabricated from heavy gauge galvanized steel. The rigid one-piece cabinet assembly shall be constructed so that it is self-supporting, and can be installed prior to the chassis arrival, and to be able to avoid damage during construction. Top, base, blower deck, and other metal structural parts are to be 16 gauge construction, while exterior panels to be 20 gauge; unit further strengthened by structural breaks at corners. **Units not constructed of a minimum of these thicknesses are not acceptable.** Cabinet shall have a full panel over the chassis opening for structural rigidity of the cabinet; **no "open" top or "open" bottom designs allowed.**

The cabinet base shall contain a secondary drain pan fully insulated with a pressure differential drain trap connected to the condensate riser pipe, and guide rails for the slide in refrigeration chassis. Drain pan to be rubber grommet mounted to provide isolation of chassis from the cabinet. Drain pan(s) shall be easily accessible for cleaning. All interior surfaces shall be lined with 1/2 inch (12.7mm) thick, 1-1/2 lb/ft3 (24 kg/m3) acoustic type fiberglass insulation. All insulation shall be foil faced and have exposed edges butted up to flanges to prevent the introduction of glass fibers into the air stream.

Standard insulation must meet NFPA Fire Hazard Classification requirements 25/50 per ASTM E84, UL 723, CAN/ULC S102-M88 and NFPA 90A requirements; air erosion and mold growth limits of UL-181; stringent fungal resistance test per ASTM-C1071 and ASTM G21; and shall meet zero level bacteria growth per ASTM G22. **Unit insulation must meet these stringent requirements or unit(s) will not be accepted.**

Standard air filter is 1 inch (25mm) thick fiberglass throwaway.

Option: 2 inch (50mm) thick fiberglass throwaway.

Cabinet arrangements shall allow placement of riser piping on any one of the three sides of the cabinet not used for the chassis access and air supply. All cabinets shall have supply air knockouts on all sides and top. Field shall configure cabinets by removing factory knockouts and install duct flanges per model configuration shown on plans. For air noise attenuation purposes, the discharge air from fan shall discharge into insulated plenum that also contains x-shape painted air baffle. **Units not having supply air noise baffles are not acceptable.** Cabinet design shall allow a full height base board (4.50 inches/114mm) beneath the return air "G" panel. The cabinet shall contain an easily removable motor/blower assembly.

Electrical conduit shall be installed from electrical unit control compartment to top of cabinet for low voltage control wiring as well as separate conduit for main power wiring. **Units without these two factory installed electric conduits will not be accepted.**

Option: Master and slave cabinets.

Option: Cabinet to have harness for connection to A9155 Series thermostat mounted to ADA "G" return air panel.

Option: Cabinet construction for surface or remote thermostat.

Option: Cabinet height 80" or 88" (203 or 223 cm)

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Full-length supply, return, and insulated condensate water risers shall be type M copper. Supply and return risers have integral internal piping including ball valves (for shut off purposes at unit). Risers and piping shall be factory pressure tested to check for leaks. Field installed hose kits are required to connect the chassis piping to the cabinet ball valve. The condensate riser shall be insulated with 3/8" (9.5mm) Armaflex type insulation. The top of each riser shall be deeply swaged (3 in./76.2mm) to accept connection to the riser above/below, allowing for a floor to floor dimensional variance of ± one inch (25.4mm). **Units not having swaged riser-piping connections shall not be acceptable. Couplings and trim pieces shall not be allowed.**

Option: Bulk ship risers so complete riser stack can be installed, pressure tested, and filled before the cabinets are installed.

Option: Type L riser piping.

Option: Supply and return risers insulated with 3/8" (9.5mm) ARMAFLEX type insulation.

Option: Construction for unit mounted Thermostat (thermostat ordered separate) -- includes junction box mounted outside discharge plenum and has a Molex-type connector inside for quick connection to A91558 Series thermostat. Use part number A9155801, A9155802, A9155810, A9155804, A9155805, or A9155806 thermostat assembly, which is thermostat model ATA11U01, ATA11U03, ATP21W02, ATA22U01, ATP32U03C or ATC32U02C respectively with mating molex-type connector.

Option: Low voltage 15, 25, or 35 foot (572, 762, or 1,067 cm) wire whip with molex-type connector for connection to remote mounted thermostat, or for ADA return air panel mounted thermostat. Use part number A9155801, A9155802, A9155809 for ADA or A9155811 for remote, A9155804, A9155805, or A9155806 thermostat assembly, which is thermostat model ATA11U01, ATA11U03, ATP21W02, ATA22U01, ATP32U03C or ATC32U02C respectively with mating molex-type connector.

Option: Cabinet to have wire harness for connection to A91558 series thermostat mounted to ADA "G" return air panel.

Option: Premium automotive grade rubber seal between cabinet inner panel and chassis.

Fan and Motor Assembly:
The cabinet shall contain a removable motor/blower assembly. Units shall have a direct drive centrifugal fan. The fan motor shall be 3 speed, permanently lubricated, PSC type with thermal overload protection. The fan motor for small size units (09 and 12) shall be isolated from the fan housing by a torsionally flexible motor mounting system with rubber type grommets to inhibit vibration induced high noise levels associated with "hard wire belly band" motor mounting. The fan motor on medium and large units (15-36) shall be isolated with flexible rubber type isolation grommets only. Airflow/External static pressure rating of the unit shall be based on a wet coil and clean filter**. Ratings based on a dry coil and/or no air filter shall not be acceptable.**

Option: ECM variable speed ball bearing type motor. The ECM fan motor shall provide soft starting, maintain constant CFM over its static operating range and provide airflow adjustment in 25 CFM increments via its control board. The fan motor shall be isolated from housing by rubber grommets. The motor shall be permanently lubricated and have thermal overload protection. A special dehumidification mode shall be provided to allow lower airflows in cooling for better dehumidification. The dehumidification mode may be constant or automatic (humidistat controlled).

Chassis:
The chassis, which incorporates the air coil, water coil, drain pan with solid-state electronic condensate overflow protection, compressor, and electrical components shall be easily installed for quick jobsite installation and future servicing purposes. The slide in chassis shall have insulated panels surrounding the compressor. Compressors are not in the air stream. The chassis base shall be fabricated from heavy gauge galvanized steel formed to match the slide in rails of the cabinet. Units shall have a factory installed 1 inch (25.4mm) thick filter bracket and throwaway type glass fiber filter. Furnish one spare set of filters.

Option: Chassis can ship upright in any cabinet that risers are not attached.

Option: UltraQuiet package shall consist of high technology sound attenuating material that is strategically applied to the compressor (rotary only) and inside compressor compartment to dampen and attenuate sound transmissions. Compressor is mounted on specially engineered sound-tested isolators.

Water connections between chassis and the cabinet shall be accomplished via a hose kit consisting of Kevlar-reinforced EPDM core hose surrounded by a stainless-steel braid. Hose kit shall have brass fittings with stainless-steel ferrules. Hose ends shall be solid External MPT which connects to mating fitting on cabinet shut off ball valve(s), and Internal NPSM (National Pipe Straight Mechanical) swivel end with fiber or EPDM washer which connects to mating threaded end connection on chassis. The hose kit shall be rated for 400 psi (2756 kPa) design working pressure.

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Tranquility® Modular - TSM Series
Engineering Specifications – Page 3

Refrigerant Circuit:
All units shall contain an EarthPure® (HFC-410A) sealed refrigerant circuit including a high efficiency scroll or rotary compressor designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, an enhanced corrugated aluminum lanced fin and rifled copper tube refrigerant to air heat exchanger, reversing valve, coaxial (tube in tube) refrigerant to water heat exchanger, and safety controls including a high pressure switch, low pressure switch (loss of charge), water coil low temperature sensor, and air coil low temperature sensor. Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service. Activation of any safety device shall prevent compressor operation via a microprocessor lockout circuit. The lockout circuit shall be reset at the thermostat or at the contractor supplied disconnect switch. **Units that cannot be reset at the thermostat shall not be acceptable.**

Hermetic compressors shall be internally sprung and externally isolated. The compressor shall have a dual level vibration isolation system. The compressor will be mounted on specially engineered sound-tested EPDM vibration isolation grommets to a large heavy gauge compressor base pan, which is then isolated from the cabinet by resting on condensate drain pan which is isolated by grommets for maximized vibration attenuation. All units (except units with rotary compressors) shall include a discharge muffler to further enhance sound attenuation. Compressor shall have thermal overload protection.

Refrigerant to air heat exchangers shall utilize enhanced corrugated lanced aluminum fins and rifled copper tube construction rated to withstand 625 PSIG (4309 kPa) refrigerant working pressure. Copper hairpins are tin electroplated for added protection from formicary corrosion. **Units that do not have tin-plated hairpins shall not be acceptable.**

Refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 625 PSIG (4309 kPa) working refrigerant pressure and 500 PSIG (3445 kPa) working water pressure. The refrigerant to water heat exchanger shall be “electro-coated” with a low cure cathodic epoxy material a minimum of 0.4 mils thick (0.4 – 1.5 mils range) on all surfaces. The black colored coating shall provide a minimum of 1000 hours salt spray protection per ASTM B117-97 on all external steel and copper tubing. The material shall be formulated without the inclusion of any heavy metals and shall exhibit a pencil hardness of 2H (ASTM D3363-92A), crosshatch adhesion of 4B-5B (ASTM D3359-95), and impact resistance of 160 in-lbs (184 kg-cm) direct (ASTM D2794-93).

Refrigerant metering shall be accomplished by thermostatic expansion valve only. Expansion valves shall be dual port balanced types with external equalizer for optimum refrigerant metering. Units shall be designed and tested for operating ranges of entering water temperatures from 20° to 120°F (-6.7° to 48.9°C). Reversing valve shall be four-way solenoid activated refrigerant valve, which shall default to heating mode should the solenoid fail to function. If the reversing valve solenoid defaults to cooling mode, an additional low temperature thermostat must be provided to prevent over-cooling an already cold room.

Option: The unit will be supplied with non-plated air to refrigerant heat exchanger.

Option: The unit will be supplied with cupro-nickel coaxial water to refrigerant heat exchanger.

Option: The unit will be supplied with internally factory mounted modulating water valve for heating operation to 120°F (48.9°C).

Option: The unit will be supplied with internally factory mounted two-way water valve for variable speed pumping requirements. Valve to be normally closed type.

Option: The unit will be supplied with internally factory mounted automatic water flow regulators.

Option: The unit will be supplied with internally factory mounted variable speed pump.

Option: The unit will be supplied with internally mounted secondary pump for primary/secondary applications.

Cabinet Drain Pan:
The drain pan shall be constructed of galvanized steel and have a powder coat paint application to further inhibit corrosion. This corrosion protection system shall meet the stringent 1000 hour salt spray test per ASTM B117. Drain pan to be isolated from cabinet with four EPDM vibration isolation grommets. If plastic type material is used, it must be HDPE (High Density Polyethylene) to avoid thermal cycling shock stress failure over the lifetime of the unit. Drain pan shall be fully insulated. Drain pan shall have at a minimum a doubled sloped surface to allow positive drainage to the outlet opening, which shall be at the lowest level of the entire pan surface. Drain outlet shall be connected from pan outlet to condensate riser (if supplied) with factory installed trap inside of cabinet. The cabinet drain pan as standard will be supplied with solid-state electronic condensate overflow protection. **Drain pans that are not isolated from cabinet shall not be acceptable. Mechanical float switches will NOT be accepted.**

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Tranquility® Modular - TSM Series
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Option: Stainless steel drain pan

Electrical:
A control compartment shall be located within the chassis and shall contain a 50VA transformer, 24 volt activated, 2 pole compressor contactor, relay and solid-state controller for complete unit operation. Reversing valve and fan motor wiring shall be routed through this electronic controller. Units shall be name-plated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24 Volt and provide heating or cooling as required by the remote thermostat/sensor. A control compartment shall be located within the cabinet and shall contain a terminal block for high voltage connections. All electrical connections between the chassis and cabinet shall be made via locking quick-connects.

Option: Disconnect Switch, Non-Fused, classified as motor disconnect.

Option: Circuit Breaker, all 208/230 volt and 265 volt, 15 and 20 amp - HACR rated, 265 volt 25 amp and higher - supplemental rated.

Solid State Control System (CXM):
Units shall have a solid-state control system. Units utilizing electro-mechanical control shall not be acceptable. The control system microprocessor board shall be specifically designed to protect against building electrical system noise contamination, EMI, and RFI interference. The control system shall interface with a heat pump type thermostat. The control system shall have the following features:

a. Anti-short cycle time delay on compressor operation.
b. Random start on power up mode.
c. Low voltage protection.
d. High voltage protection.
e. Unit shutdown on high or low refrigerant pressures.
f. Unit shutdown on low water temperature.
g. Condensate overflow electronic protection.
h. Option to reset unit at thermostat or disconnect.
i. Automatic intelligent reset. Unit shall automatically reset the unit 5 minutes after trip if the fault has cleared. If a fault occurs 3 times sequentially without thermostat meeting temperature, then lockout requiring manual reset will occur.
j. Ability to defeat time delays for servicing.
k. Light emitting diode (LED) on circuit board to indicate high pressure, low pressure, low voltage, high voltage, low water/air temperature cut-out, condensate overflow, and control voltage status.
l. The low-pressure switch shall not be monitored for the first 120 seconds after a compressor start command to prevent nuisance safety trips.
m. 24V output to cycle a motorized water valve or other device with compressor contactor.
n. Unit Performance Sentinel (UPS). The UPS warns when the heat pump is running inefficiently.
o. Water coil low temperature sensing (selectable for water or antifreeze).
p. Air coil low temperature sensing.

Units not providing the 8 safety protections of anti-short cycle, low voltage, high voltage, high refrigerant pressure, low pressure (loss of charge), air coil low temperature cut-out, water coil low temperature cut-out, leaving water high pressure switch, and condensate overflow protection for both drain pans will not be accepted.

Option: Enhanced solid state control system (DXM2)
This control system is a communicating controller, also features two stage control of cooling and two stage control of heating modes for exacting temperature and dehumidification purposes.

This control system coupled with a multi-stage thermostat will better dehumidify room air by automatically running the heat pump's fan at lower speed on the first stage of cooling thereby implementing low sensible heat ratio cooling. On the need for higher cooling performance the system will activate the second stage of cooling and automatically switch the fan to the higher fan speed setting. This system may be further enhanced with a humidistat. **Units not having automatic low sensible heat ratio cooling will not be accepted; as an alternate a hot gas reheat coil may be provided with control system for automatic activation.**

This controller shall have sensors to monitor entering water, leaving water, supply air, and compressor discharge line temperatures. Temperatures can be read by using service tool or communicating thermostat.

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Control shall have all of the above-mentioned features of the CXM control system along with the following expanded features:

a. Removable thermostat connector.
b. Night setback control.
c. Random start on return from night setback.
d. Minimized reversing valve operation (Unit control logic shall only switch the reversing valve when cooling is demanded for the first time. The reversing valve shall be held in this position until the first call for heating, ensuring quiet operation and increased valve life.).
e. Override temperature control with 2-hour timer for room occupant to override setback temperature at the thermostat.
f. Dry contact night setback output for digital night setback thermostats.
g. Ability to work with heat pump or heat/cool (Y, W) type thermostats.
h. Ability to work with heat pump thermostats using O or B reversing valve control.
i. Emergency shutdown contacts.
j. Boilerless system heat control at low loop water temperature.
k. Ability to allow up to 3 units to be controlled by one thermostat.
l. Relay to operate an external damper.
m. Ability to automatically change fan speed from multistage thermostat.
n. Relay to start system pump.
o. 75 VA control transformer. Control transformer shall have load side short circuit and overload protection via a built in circuit breaker.

Units not providing the 8 safety protections of anti-short cycle, low voltage, high voltage, high refrigerant pressure, low pressure (loss of charge), air coil low temperature cut-out, water coil low temperature cut-out, and condensate overflow protection for both drain pans will not be accepted.

When DXM2 is connected to either ACDU service tool or ATC32U thermostat the installer/serviceman can; check and set CFM; check dip switch S1, S2, and S3 settings; run operation modes manually; check all physical inputs from thermostat and refrigerant pressure switches status, (Y1, Y2, W, O, G, H, ESD, NSB, OR, HP switch, and LOC switch); current or at time of fault the following temperatures -LT1, LT2, compressor discharge, leaving air, leaving water, entering water and control voltage; record last five faults, list possible reasons, and clear faults.

Digital Night Setback with Pump Restart (DXM2 w/ ATP32U03C/04C, ATC32U02C)
The unit will be provided with a Digital Night Setback feature using an accessory relay on the DXM2 controller with an ATP32U03/04 thermostat and an external, field-provided time clock. The external time clock will initiate and terminate the night setback period. The thermostat will have a night setback override feature with a programmable override time period.
An additional accessory relay on the unit DXM2 controller will energize the building loop pump control for the duration of the override period**. (Note: this feature requires additional low voltage wiring. Consult Application Drawings for details.)**

Remote Service Sentinel (CXM/DXM2):
Solid state control system shall communicate with thermostat to display (at the thermostat) the unit status, fault status, and specific fault condition, as well as retrieve previously stored fault that caused unit shutdown. The Remote Service Sentinel allows building maintenance personnel or service personnel to diagnose unit from the wall thermostat. The control board shall provide a signal to the thermostat fault light, indicating a lockout. Upon cycling the G (fan) input 3 times within a 60 second time period, the fault light shall display the specific code as indicated by a sequence of flashes. A detailed flashing code shall be provided at the thermostat LED to display unit status and specific fault status such as over/under voltage fault, high pressure fault, low pressure fault, low water temperature fault, condensate overflow fault, etc. **Units that do not provide this remote service sentinel shall not be acceptable.**

Option: Lonworks interface system
Units shall have all the features listed above (either CXM or DXM2) and the control board will be supplied with a LONWORKS interface board, which is LONMark certified. This will permit all units to be daisy chained via a 2-wire twisted pair shielded cable. The following points must be available at a central or remote computer location:

a. Space temperature
b. Leaving water temperature
c. Discharge air temperature
d. Command of space temperature setpoint
e. Cooling status
f. Heating status
g. Low temperature sensor alarm
h. Low pressure sensor alarm

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i. High pressure switch alarm
j. Condensate sensor alarm
k. Hi/low voltage alarm
l. Fan "ON/AUTO" position of space thermostat as specified above
m. Unoccupied/occupied command
n. Cooling command
o. Heating command
p. Fan "ON/AUTO" command
q. Fault reset command
r. Itemized fault code revealing reason for specific shutdown fault (any one of 7)

This option also provides the upgraded 75VA control transformer with load side short circuit and overload protection via a built in circuit breaker.

Option: MPC (Multiple Protocol Control) interface system
Units shall have all the features listed above (either CXM or DXM2) and the control board will be supplied with a Multiple Protocol interface board. Available protocols are BACnet MS/TP, Modbus, or Johnson Controls N2. The choice of protocol shall be field selectable/changeable via the use of a simple selector switch. Protocol selection shall not require any additional programming or special external hardware or software tools. This will permit all units to be daisy chain connected by a 2-wire twisted pair shielded cable. The following points must be available at a central or remote computer location:

a. Space temperature
b. Leaving water temperature
c. Discharge air temperature
d. Command of space temperature setpoint
e. Cooling status
f. Heating status
g. Low temperature sensor alarm
h. Low pressure sensor alarm
i. High pressure switch alarm
j. Condensate overflow alarm
k. Hi/low voltage alarm
l. Fan "ON/AUTO" position of space thermostat as specified above
m. Unoccupied/occupied command
n. Cooling command
o. Heating command
p. Fan "ON/AUTO" command
q. Fault reset command
r. Itemized fault code revealing reason for specific shutdown fault (any one of 7)

This option also provides the upgraded 75VA control transformer with load side short circuit and overload protection via a built in circuit breaker.

Return Panel:
The return panel shall be architecturally designed, acoustic type, flush mounted with hinged door for easy and quick access to filter and unit interior. Chassis shall be easily removed. The hinged return panel shall be made of heavy gauge die formed galvanized steel with a powder coat finish in "polar ice" color.

Return air panels that protrude from wall more than 5/8 inch (15.9mm) are not acceptable.

Option: "G" panel with mounting for ADA thermostat allows thermostat to be mounted low to comply with ADA height requirement.

Option: "G" panel with keyed locks - prevents users from tampering with units.

Option: Style "G" return air panel with frame for recessing cabinet behind finished wall.

Option: Motorized fresh air damper for "G" panel with frame - allows outside air to enter on right or left side.

Supply grille(s):
Supply grille(s) shall be architecturally designed "brushed" aluminum or powder coated steel (color: polar ice).

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Option: Supply grille with double deflection style louvers.

Option: Supply grille with double deflection style louvers with opposed damper.

Warranty:
ClimateMaster shall warranty equipment for a period of 12 months from start up or 18 months from shipping (which ever occurs first).

Option: Extended 4-year compressor warranty covers compressor for a total of 5 years.

Option: Extended 4-year refrigeration circuit warranty covers coils, reversing valve, expansion valve and compressor for a total of 5 years.

Option: Extended 4-year control board warranty covers the CXM/DXM2 control board for a total of 5 years.

FIELD INSTALLED OPTIONS

Hose Kits - AHH Series (required for field water connections):
Water connections between chassis and the cabinet shall be accomplished via a hose kit consisting of Kevlar-reinforced EPDM core hose surrounded by a stainless-steel braid. Hose kit shall have brass fittings with stainless-steel ferrules. Hose ends shall be solid External NPT which connects to mating fitting on cabinet shut off ball valve(s), and Internal NPSM (National Pipe Straight Mechanical) swivel end with fiber or EPDM washer which connects to mating threaded end connection on chassis. The hose kit shall be rated for 400 psi (2756 kPa) design working pressure. This hose kit accessory is required for each cabinet.

Filters:
Pleated media disposable 1 inch (25mm) thick MERV 8 or MERV 11, 2 inch (50mm) thick MERV 8, MERV 11 or MERV 13.

Thermostats:
The thermostat shall be a ClimateMaster electronic type thermostat as selected below with the described features:

Note: To achieve full benefit of controls, use 2 speed thermostat (switch for manual or Y2 for automatic change).

a. Multistage Digital Automatic or Manual Changeover Programmable Communicating (ATC32U02C)
Thermostat shall be electronic communicating LCD 7 Day Programmable (with up to 4 setpoints per day), thermostat shall be provided. The thermostat shall offer three stages of heating and two stages of cooling with precise temperature control and have a four-wire connection to the unit. The thermostat shall be capable of manual or automatic change-over operation and shall operate in standard or programmable mode. An integrated humidity control feature shall be included to control a humidifier and/or a dehumidifier. The thermostat shall include a utility demand reduction feature to be initiated by an independent time program or an external input.
The thermostat shall have a comprehensive installation setup menu to include configuration of the unit CFM for each mode of operation (ECM motor option required).
The thermostat shall display system faults with probable cause and troubleshooting guidance. Comprehensive service diagnostics menus shall display, system inputs, system outputs, configuration settings, Geo source inlet and outlet temperatures, compressor discharge line temperature, liquid line temperature, leaving air temperature. The thermostat shall allow for immediate manual control of all DXM2 outputs at the thermostat for rapid troubleshooting.

b. Single Stage Digital Auto or Manual Changeover (ATA11U01)
Thermostat shall be a single-stage, digital, auto or manual changeover with HEAT-OFF-COOL-AUTO system switch and fan ON-AUTO switch. Thermostat shall have an LCD display with temperature and setpoint(s) in ºF or ºC. The Thermostat shall provide permanent memory of setpoint(s) without batteries. A fault LED shall be provided to display specific fault condition. Thermostat shall provide temperature display offset for custom applications.

c. Single Stage Digital Auto or Manual Changeover and Manual Two Fan Speed Selections (ATA11U03)
Thermostat shall be a single-stage, digital, auto or manual changeover with HEAT-OFF-COOL-AUTO system settings, high and low fan settings and fan ON-AUTO settings. Thermostat shall have an LCD display with temperature, setpoint(s), mode, and status indication. The temperature indication shall be selectable for ºF or ºC. The thermostat shall provide permanent memory of setpoint(s) without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall allow the use of an accessory remote temperature sensor (17B0008N05). Thermostat navigation shall be accomplished via 4 push buttons.

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d. Multistage Digital Automatic Changeover (ATA22U01)
Thermostat shall be multi-stage (2H/2C), manual or automatic changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have an LCD display with temperature, setpoint(s), mode, and status indication. The temperature indication shall be selectable for ºF or ºC. The thermostat shall provide permanent memory of setpoint(s) without batteries. A fault LED shall be provided to indicate specific fault condition(s). Thermostat shall provide temperature display offset for custom applications. Thermostat shall allow unit to provide better dehumidification with optional DXM2 controller by automatically using lower fan speed on stage 1 cooling (higher latent cooling) as main cooling mode, and automatically shifting to high-speed fan on stage 2 cooling. Thermostat can be configured to heat and cool even if in off mode (replaces night low limit switch (NLLS) in cabinet).

e. Multistage Manual Changeover Programmable 5/2 Day (ATP21W02)
Thermostat shall be 5 day/2 day programmable (with up to 4 setpoints per day), multi-stage (2H/1C), manual or automatic changeover with HEAT-OFF-COOL-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have an LCD display with temperature, setpoint(s), mode, and status indication. The temperature indication shall be selectable for ºF or ºC.

f. Multistage Automatic or Manual Changeover Programmable 7 Day (ATP32U03C)
Thermostat shall be 7 day programmable (with up to 4 setpoints per day), multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have a blue backlit dot matrix LCD display with temperature, setpoints, mode, and status indication. The temperature indication shall be selectable for ºF or ºC. Time display shall be selectable for 12 or 24-hour clock. Fault identification shall be provided (when used with ClimateMaster CXM or DXM2 controls) to simplify troubleshooting by providing specific unit fault at the thermostat with red backlit LCD during unit lockout. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring options and for setup of servicing contractor name and contact information. Thermostat shall allow the use of an accessory remote and/or outdoor temperature sensor (AST008C). Thermostat navigation shall be accomplished via five buttons (up/down/right/left/select) with menu-driven selections for ease of use and programming.

g. Multistage Automatic or Manual Changeover Programmable 7 Day with Humidity Control (ATP32U04C)
Thermostat shall be 7 day programmable (with up to 4 setpoints per day), multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Separate dehumidification and humidification setpoints shall be configurable for discreet outputs to a dehumidification option and/or an external humidifier. Installer configuration mode shall allow thermostat dehumidification mode to operate with ClimaDry® reheat or with ECM fan dehumidification mode via settings changes. Thermostat shall have a blue backlit dot matrix LCD display with temperature, relative humidity, setpoints, mode, and status indication. The temperature indication shall be selectable for ºF or ºC. Time display shall be selectable for 12 or 24 hour clock. Fault identification shall be provided (when used with ClimateMaster CXM or DXM2 controls) to simplify troubleshooting by providing specific unit fault at the thermostat with red backlit LCD during unit lockout. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring options and for setup of servicing contractor name and contact information. Thermostat shall allow the use of an accessory remote and/or outdoor temperature sensor (AST008C). Thermostat navigation shall be accomplished via five buttons (up/down/right/left/select) with menu-driven selections for ease of use and programming.

DDC Sensors:
ClimateMaster wall mounted DDC sensor to monitor room temperature and interfaces with optional DDC interface system described above. Several types as described below:
a. Sensor only with no display (LON and MPC).
b. Sensor with override (LON only).
c. Sensor with setpoint adjustment and override (MPC only).
d. Sensor with setpoint adjustment and override, LCD display, status/fault indication (LON and MPC).

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Revision History

Date:	Item:	Action:
12/16/14	Edits - page 59	Updated
12/12/14	Table - page 37	Updated
11/11/14	Added ATP21W02 Thermostat, Electric Heat, iGate Options, Misc. Changes. Removed ATP21U01 Thermostat.	Updated
06/17/14	Vertical Shipping Table - page 62	Updated
06/05/14	Engineering Specifications	Updated
05/30/14	Table - page 28	Updated
05/28/14	Table, illustration and text - pages 52 & 64; Change DXM to DXM2 - All pages	Updated
05/23/14	Table, illustration and text - pages 33, 52, 64, 67, 69	Updated
05/12/14	Pages 7, 30, 33, 46, 51, 64	Updated
05/05/14	Pages 51 & 66	Updated
05/02/14	Pages 4, 27-28, 42, 51, 53, 55, 64-66, 68	Updated
03/27/14	Illustration - page 47	Updated
03/06/14	Tables and text	Updated
02/18/14	Entering Air Correction Tables - Page 26	Updated
12/13/13	Text and tables	Updated
XXXXXX	Multiple items	ECM blower data added.
07/03/13	Created	

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